AN EVALUATION OF THE LONGITUDINAL DYNAMIC STABILITY OF AN AIRCRAFT AT STALL

John Thomas Frederiksen

NAVAL POSTGRADUATE SCHOOL
Monterey, California

THESIS

AN EVALUATION OF THE LONGITUDINAL DYNAMIC
STABILITY OF AN AIRCRAFT AT STALL

by

John Thomas Frederiksen

Thesis Advisor: L. V. Schmidt

June 1972

Approved for public release; distribution unlimited.

An Evaluation of the Longitudinal Dynamic Stability

of an Aircraft at Stall

by

John Thomas Frederiksen
Lieutenant, United States Navy
B.S., United States Naval Academy, 1966

Submitted in partial fulfillment of the
requirements for the degree of

MASTER OF SCIENCE IN AERONAUTICAL ENGINEERING

from the

NAVAL POSTGRADUATE SCHOOL
June 1972

ABSTRACT

The longitudinal stability of an aircraft at or near stall was examined using the digital computer as an experimental tool to solve the longitudinal equations of motion. A linear analysis determined the effect of lift curve slope variation. An investigation was made to identify the nonlinear lift curve variations needed to create the often observed "rocking-chair" or "porpoising" stall trait. The characteristics of this limit-cycle oscillation were examined.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

FIGURE

TABLE OF SYMBOLS

C_D	Drag Coefficient	
C_L	Lift Coefficient	
$C_{L\alpha}$	Lift Coefficient derivative for angle of attack	per radian
$C_{L\ max}$	Maximum attainable Lift Coefficient	
C_m	Pitching Moment Coefficient	
$C_{m\alpha}$	Pitching Moment Coefficient derivative for angle of attack	per radian
$C_{x\dot{\alpha}}$	Aerodynamic Force Coefficient derivative for angle of attack rate	per radia per second
ΔC_L	Change in Lift Coefficient on the Lift Curve	
t	Time	seconds
u	Aircraft velocity in x direction	feet per second
V	Aircraft resultant velocity	feet per second
w	Aircraft velocity in z direction	feet per second
α	Angle of Attack	radians
δ_e	Elevator deflection	radians
λ	Root of the characteristic equation	per second
ω_n	Undamped natural frequency	radians per seconds
θ	Pitch Angle	radians
$\dot{\theta}$	Pitch Angle rate of change with time	radians per second
ξ	Damping ratio	

ACKNOWLEDGMENTS

The author wishes to thank Professor Louis V. Schmidt, Professor of Aeronautics at the Naval Postgraduate School, for his guidance and support as thesis advisor. The author would also like to express his appreciation to Lieutenant Carlton W. Saul for his assistance in the preparation of the computer program used in this thesis.

I. INTRODUCTION

Federal and military aviation requirements stipulate that all aircraft possess stalling characteristics which comply with established criteria. The Federal Aviation Regulations, Part 23 of "Airworthiness Standards" state, in part, that "acceptable stalling characteristics be demonstrated...in straight flight with wings level...where the primary control manipulation is a steady progressive upward movement of the elevator until the aircraft is stalled." A desirable stall characteristic in a longitudinal sense would include a small but distinguishable drop in the nose of the aircraft, which can not be overridden by the pilot. Also, if the elevator control were eased forward, the aircraft should promptly return to unstalled flight.

The exact definition of aircraft stall will differ among the pilot, wing design specialist, stability and control expert, and all others who will have their own interpretation. Highly sweptwinged, supersonic aircraft have discredited the idea of flow separation, $C_{L\ max}$, and a stable nose-down pitching moment all occuring simultaneously. The Federal Aviation Regulations, Part 25, defines the calibrated stalling speed for a civil air transport as"...the minimum steady speed, in knots, at which the aircraft is controllable..." For the purpose of this treatise, stall may be described as the condition when flow breakdown, primarily over the main wing, causes significant nonlinear effects in the moment and lift

characteristics. The effect of an asymmetric flow condition leading to wing drop will not be considered, since only the longitudinal stability traits are being analyzed.

A considerable amount of literature is available on the subject of aircraft static stability at stall, and it describes the aircraft's initial tendencies, or stall characteristics. Some literature is available concerning dynamic stability at deep stall, or large angles of attack. There is, however, very little treatment of airplane dynamics in the area of $C_{L\ max}$, of post-stall time histories in that narrow region of the stall break, or of the oscillations that might occur.

Most pilots with any degree of proficiency have experienced a "rocking-chair" or "porpoising" type of stall where, with constant elevator control, the aircraft's nose oscillates vertically about some point as the wing stalls, recovers, rotates back up into the stall, and so on. It was the purpose of this study, therefore, to numerically investigate the mechanism required to create this type of limit-cycle, or possibly divergent, rocking-chair motion, using the complete set of aircraft equations of motion, and to attempt to describe the major factors influencing this phenomenon.

Because of time considerations and the availability of data, this study was limited to only the longitudinal stability, with no roll, yaw, or coupling considered, of a small, straight-winged jet aircraft with zero thrust. All computations were accomplished at the W.R. Church Computer

Center, Naval Postgraduate School, Monterey, California, using the IBM 360/67 digital system and standard FORTRAN language. The study was accomplished during the period September 1971 through June 1972.

II. AIRCRAFT MODEL AND ASSUMPTIONS

The input data used in this study were those for an F-94 Aircraft obtained from Ref. 1. The aircraft is a straight-winged, tandem-seated, single-engine jet, with the center of gravity positioned well within the fore and aft limits. A zero thrust landing configuration at sea level on a standard day exists throughout this analysis. The aircraft has basically linear aerodynamic characteristics except for lift, drag and pitching moment coefficients, which are all functions of angle of attack. Terms relating to such variables as elevator control effectiveness and pitch and angle of attack damping are also assumed to be linear. The aircraft was considered stick-fixed, with the elevator being the only means of longitudinal control and trim. The case of pitch-up at stall was neglected. Figure 1 shows the aircraft axis system and the related variables.

III. DISCUSSION AND RESULTS

Static longitudinal stability may be considered as the tendency of the aircraft to return to static equilibrium, while dynamic longitudinal stability considers the resulting aircraft motion as a function of time. The existence of static stability does not necessarily intimate the existence

of dynamic stability. However, the existence of asymptotic dynamic stability in the sense of Lyapunov (Ref. 4) implies static stability.

The factors influencing aircraft stability at a stalled condition must be known in order to predict or create an instability. The airplane has six degrees of freedom: rotation in roll, pitch and yaw, and translation in the horizontal, vertical and lateral directions. The principal variables in the longitudinal motion are:

(1) the pitch attitude of the airplane,

(2) the angle of attack,

(3) the flight velocity.

The equations of motion describing the longitudinal motion of the aircraft are found in Ref. 2. These equations are ordinary nonlinear differential equations in five variables, with time as the independent variable. A complete derivation of the equations and their application to the problem of aircraft stall may be found in Ref. 3.

To perform a sensitivity analysis on the stability derivatives near stall, the equations were simplified by assuming a constant elevator position and a horizontal initial flight path. Reference 2, Chapter 6, reduces the equations to three homogeneous algebraic equations in the unknowns u, α, and θ. By setting the determinant of the coefficients equal to zero, the roots, λ, of the characteristic equation may be found. Expansion of this "stability determinant" results in a quartic equation for λ of the form:

$$A\lambda^4 + B\lambda^3 + C\lambda^2 + D\lambda + E = 0$$

The solution of this equation results in two pairs of complex conjugate roots. These roots may be expressed either in non-dimensional time or real time, with our interest focusing on ζ, the damping ratio, and ω_n, the natural frequency. These numbers are easily calculated along with the resulting period of oscillation. For a dynamically stable aircraft, the real part of all of the roots must be negative; that is, the damping ratio is positive. An instability results if any of the damping terms are negative.

Upon analysis of the equations of motion, the only stability derivatives making a significant contribution to stability were: $C_{L\alpha}$, $C_{m\alpha}$, and $C_{x\dot{\alpha}}$. By varying these parameters and observing the damping ratios of the resulting roots of the stability determinant, a feel for the important factors in aircraft stability may be developed.

Only two stability derivatives are of sufficient magnitude to contribute to dynamic stability. The first of these is $C_{m\alpha}$, the static stability derivative. As $C_{m\alpha}$ becomes positive, the aircraft becomes statically unstable. This condition will not be considered since most aircraft demonstrate positive static stability through the stall, and dynamic stability is of concern here. The second stability derivative of concern is $C_{L\alpha}$, the lift curve slope. The results of varying lift curve slope are shown in Table 1.

The aircraft demonstrates dynamic stability when $C_{L\alpha}$ is positive, zero or slightly negative. When the lift curve slope reaches approximately -5.0, one pair of the roots of the characteristic equation has a positive real part which indicates aircraft instability. The instability remains as the lift curve slope is increased negatively (c.f., Fig. 2), A negative slope of the lift curve could occur after the maximum lift is reached in the area of stall, or in the case of a sharp stall break occurring locally.

It must be noted at this point that only the short period motion was affected by this analysis. One would expect to find, therefore, that the aircraft has a stable long period or phugoid mode, but is unstable in angle of attack, pitch angle and normal acceleration (g's), with the velocity remaining relatively constant as is characteristic of the short period mode.

The computer program used to mathematically "fly" the aircraft is discussed at length in Ref. 3. Basically, there are four variables affecting the longitudinal motion: the resultant aircraft velocity, V, the pitch angle, θ, the rate of change of pitch angle, $\dot{\theta}$, and the angle of attack, α. All are functions of time, t. The rate of change of angle of attack is considered small and is neglected. Five differential equations were used to describe the longitudinal motion, the fifth occurring by resolving the resultant aircraft velocity, V, into its components, u and w, in the x and z directions, respectively. The equations were solved by a fourth-order Runge-Kutta integration scheme. Input data

consist of the aircraft parameters such as wing area, moments of inertia, thrust coefficient, air density, etc., and a table of data with aircraft lift, drag and pitching moment coefficients as functions of angle of attack. These input values remain constant throughout any maneuvering the aircraft is required to perform. The only initial conditions read into the program are the aircraft gross weight, desired angle of attack and angle of pitch at trim.

Subroutine SPLIN1 calculates the value of C_L, C_D and C_m for the angle of attack specified from the data table by interpolation using a cubic curve-fitting scheme. Subroutine TRIM uses these data for a calculation of the corresponding velocities, elevator angle and thrust using the force and moment equations at static equilibrium. These calculated data are subsequently used as the initial conditions to start the Runge-Kutta integration scheme. Aircraft maneuvering and trim is performed by logic statements controlling elevator angle. Appendix C presents the entire computer program.

The effect of a large negative value of lift curve slope ($C_{L\alpha}$ =-10.0 per radian) beyond the stall was numerically introduced in the table look-up data for angles of attack greater than 0.4084 radians. Angles of attack less than this corresponded to the basic airplane situation as shown in Figure 3a. For angles of attack greater than this value, the lift curve slope was linear with a negative slope of -10.0 per radian. This type of drop-off in lift coefficient is not unlike that encountered in wing leading edge flow separation or stall.

The aircraft was flown (numerically on the computer) at an initial trim condition of α =0.4083 radians (very near $C_{L\ max}$), θ=0.0989 radians, and a gross weight of 12,359 lbs. for three seconds. Then a trailing-edge-up elevator impulse (back stick) of 0.50 degrees (0.008725 radians) was inserted for 0.05 seconds. The resulting time histories show the aircraft to exhibit divergent oscillations, as predicted in Fig 2, in angle of attack, pitch angle, and lift coefficient. The aircraft velocity also shows divergence, although the amplitude was very small compared with the other parameters, thus confirming the short period tendencies.

The case of stall with a smooth lift curve as defined by Fig. 3a was investigated. Aircraft time histories with the same initial conditions are shown in Figures 3b through 3e. This type of lift curve is typical of a wing trailing edge flow separation or stall. The maximum negative slope reached was $C_{L\alpha}$ =-2.0. The damping ratio for this case was positive, with negative real parts for the roots of the characteristic equation, indicating an asymptotic type of dynamic stability in the sense of Lyapunov, with a dying out of the oscillatory motion to a static equilibrium condition. Mathematically, the aircraft model and the program used to manipulate it have demonstrated both dynamic stability and instability in the region of stall based on the slope of the lift curve at angles of attack beyond that corresponding to maximum lift.

The problem of "rocking-chair" stall would indicate a limit-cycle type of oscillation. Reference 4 describes a

limit cycle as a nonlinear oscillation..."due to the presence of nonlinear terms in the differential equation." A stable limit cycle is characterized as being a unique closed curve in the phase plane, to which all other nonclosed trajectories approach in the form of spirals winding onto the limit cycle. It is a self-sustained oscillation, independent of the initial conditions. The differential equations governing the longitudinal motion are nonlinear as well as the lift, drag and moment coefficients being functions of angle of attack. With an instability in the system at static equilibrium due to the negative lift curve slope, it is possible for a limit cycle to exist.

To prevent an oscillatory divergence as shown previously, the instability was bounded by a stable lift curve slope. It may be likened to a reverse relay in a nonlinear control system. For simplicity in programming, a vertical (or infinite) lift curve slope was used locally. This allows the original lift curve table look-up data to be used and a simple logic statement decreases the interpolated value of lift coefficient by an amount ΔC_L if the angle of attack were greater than a specified amount. Appendix D shows the function subprogram F1 and the subroutine TRIM modified from Appendix C, each by only one statement. Figure 4 shows the resulting lift curve generated by this modification.

Using the same initial conditions from the previous two runs, the same 1/2-degree elevator impulse at three seconds, and changing only the lift curve to that in Fig. 4, a limit cycle oscillation, or "rocking-chair" stall was generated.

The ΔC_L used was 0.050. Figures 5b through 5e show lift coefficient, angle of attack, pitch angle and velocity as functions of time. The small elevator impulse begins an oscillation which grows to a maximum amplitude for the duration of the flight time. Figure 5a shows the phase plane plot of pitch angle (θ) versus pitch rate ($\dot{\theta}$). The curve winds onto a closed path trajectory, indicative of a limit cycle.

Amplitude of the limit cycle oscillation could be controlled by the magnitude of the ΔC_L on the lift curve. If ΔC_L were reduced by one-half, from 0.050 to 0.025, the peak amplitude of the oscillation would be halved. Conversely, if ΔC_L were doubled to 0.10, the amplitude of the limit cycle would be doubled. The period was not noticeably affected. Figure 6 shows the time history of the pitch angle for varied ΔC_L values. The initial conditions and elevator impulse remains the same as for previous runs.

The magnitude of the elevator impulse had little effect on the limit cycle oscillation. Figure 7 shows the time histories of pitch angle for impulses of 0.05 degrees and 2.0 degrees. The amplitude and period of the limit cycle remain the same. The only change was within the first fifteen to twenty seconds of flight time when the phugoid mode influenced the motion. After the phugoid has sufficiently subsided, the limit cycle motion is analagous to that previously encountered.

To further demonstrate the character of the limit cycle and its independence of initial conditions, the aircraft must damp to a constant amplitude if the initial oscillation were

greater than that for the limit cycle. Figure 8 shows the resulting time histories for an aircraft trimmed initially at an angle of attack equal to 0.250 radians, well below the stall region. An up elevator (back stick) ramp input was inserted and held at a new elevator setting corresponding to a trim condition close to stall. Since the aircraft seeks the trim condition for the elevator angle prescribed, the final elevator angle must lie in a region analagous to the elevator angle for trim at stall or wherever the instability occurs. Because of the rapid change in elevator angle, the initial magnitude of the oscillation was approximately three times that for the limit cycle. This disturbance also introduced a large amount of phugoid motion in angle of attack and pitch angle as the entire limit cycle was oscillating with a long period movement superimposed upon the short period behavior.

A ramp elevator input produced the same limit cycle. Figure 9 shows the time histories for the aircraft initially trimmed at an angle of attack equal to 0.400 radians. After three seconds, the elevator was deflected at a constant rate of one degree per second for 0.30 seconds, and then held constant. Again, the final elevator angle is in the region of the elevator angle for trim near stall.

Figure 10 shows the aircraft trimmed at an angle of attack well into the stall region (α =0.4150 radians). Down elevator (forward stick) was inserted, by a step input, to an elevator angle near that for the stall region. The aircraft pitched down and the oscillation grew to the limit cycle.

In summary, the mathematical model used in this analysis has created the desired limit cycle situation. The limit cycle is shown to be independent of the initial conditions by oscillations both decaying and growing to a stable trajectory for the state variables. It is self-sustained as shown when a small impulse is inserted for 0.05 seconds and then removed. The phase plane shows a closed path trajectory, characteristic of a limit cycle. It must be noted that the actual numbers calculated are not of prime importance, rather the ability to simulate a known flight characteristic by proper aerodynamic nonlinearities was considered valuable. The computer program could be used for any aircraft with the proper data available, whether from the wind tunnel, calculated data, or actual flight test.

IV. CONCLUSIONS

For a multi-degree of freedom system that is nonlinear in its forcing function terms due to position, and has linear damping, it is possible to obtain a limit cycle type of oscillation in the system's state variables. The governing factor in the dynamic stability of the aircraft model was the slope of the lift curve. When this slope became -5.0 or less, the aircraft was dynamically unstable in the region of stall. A sharp drop in lift coefficient just after reaching $C_{L\ max}$ produced this effect. This type of stall is characteristic of leading edge flow separation or stall.

To produce a limit cycle motion or "rocking-chair" type of stall, the unstable portion of the lift curve must be

bounded by a stable portion on each side. With this type of lift curve it is possible to create a limit cycle oscillation in the state variables: angle of attack, pitch angle and, to some degree, velocity. The frequency and the characteristics of this oscillation were analagous to that of short period motion, which was predicted by analyzing the roots of the equations of motion.

Since the aircraft is programmed to seek a trim condition at the elevator angle specified, the final elevator angle, after manipulation, must be close to that for trimmed flight in the region of maximum lift. Various types of elevator movement such as impulse, ramp, step, and forward stick produced the desired limit cycle. The resulting oscillation was independent of the initial conditions imposed, and demonstrated both a growing and damping oscillation to the same amplitude.

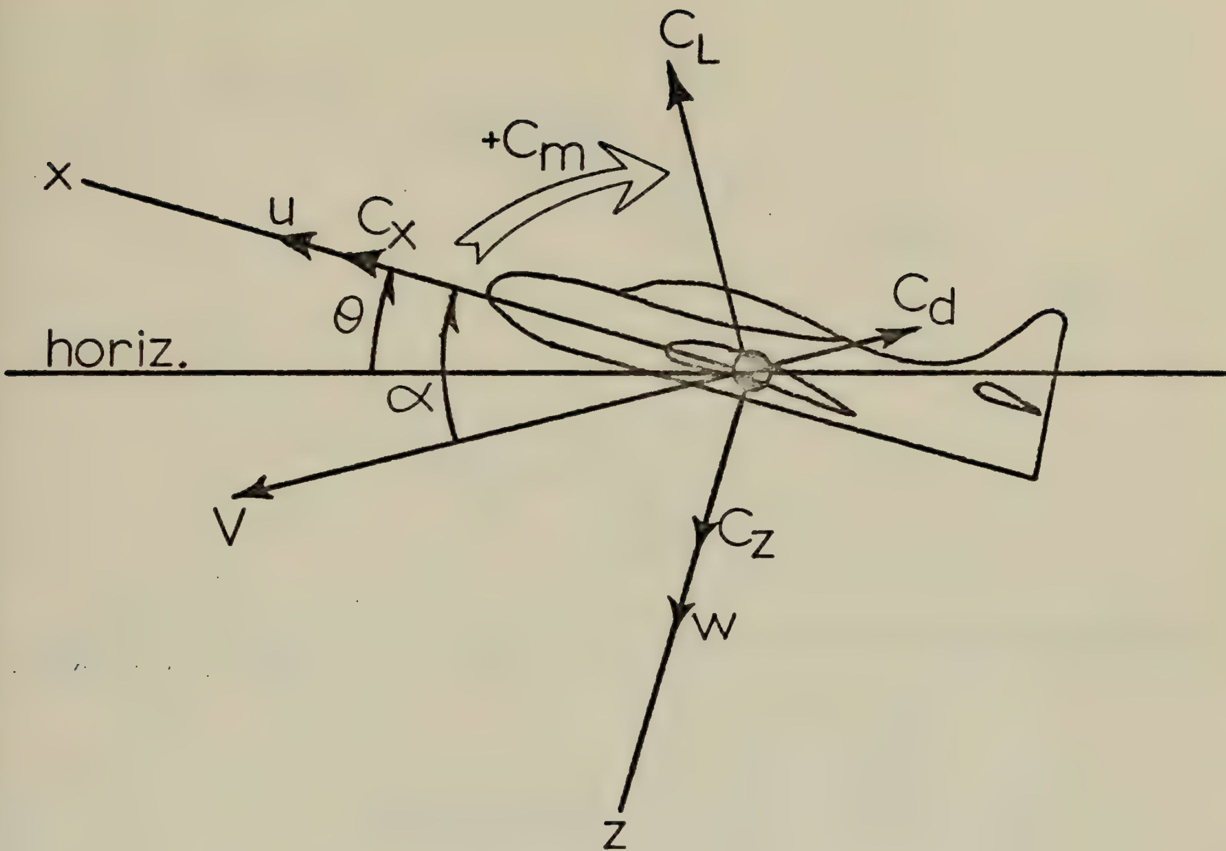
The limit cycle amplitude depended directly on the length of the unstable portion of the lift curve. If ΔC_L were doubled, the amplitude would be doubled. This numerical experiment provided enough clues to encourage subsequent studies for analytic solutions in this area and possibly related topics such as post stall-gyrations, lateral and directional movement, and spins.

TABLE I

CHARACTERISTIC EQUATION ROOTS

	Short Peroid		Phugoid		Roots	
$C_{L\alpha}$	ζ	T (sec)	ζ	T (sec)	Real Part (per sec)	Imag. Part (per sec)
5.27	0.4766	5.932	0.1995	27.100	-0.5742	1.0593
					-0.0472	0.2318
0.0	0.2479	6.094	0.1831	23.858	-0.2638	1.0310
					-0.0491	0.2634
-0.50	0.2229	6.141	0.1830	23.530	-0.2339	1.0232
					-0.0497	0.2670
-2.50	0.1139	6.395	0.1870	22.186	-0.1126	0.9825
					-0.0539	0.2832
-5.00	-0.0496	6.913	0.2085	20.507	0.0452	0.9089
					-0.0653	0.3064
-7.50	-0.2555	7.747	0.2593	19.143	0.2143	0.8110
					-0.8811	0.3282
-10.00	-0.4933	9.092	0.3325	18.565	0.3919	0.6911
					-0.1193	0.3384
-15.00	-0.9543	27.295	0.4586	19.103	0.7350	0.2302
					-0.1697	0.3289
-20.00	-1.0000	0.0	0.5406	20.245	1.7794	0.0
					-0.1995	0.3104
-25.00	-1.0000	0.0	0.5974	21.453	2.4936	0.0
					-0.2182	0.2929

$C_{m\alpha}$ was held constant at -0.5730 per radian



COORDINATE TRANSFORMATION

$$\begin{Bmatrix} C_z \\ C_x \end{Bmatrix} = \begin{bmatrix} -\cos\alpha & -\sin\alpha \\ \sin\alpha & -\cos\alpha \end{bmatrix} \begin{Bmatrix} C_L \\ C_d \end{Bmatrix}$$

FIGURE 1. AIRCRAFT AXIS SYSTEM

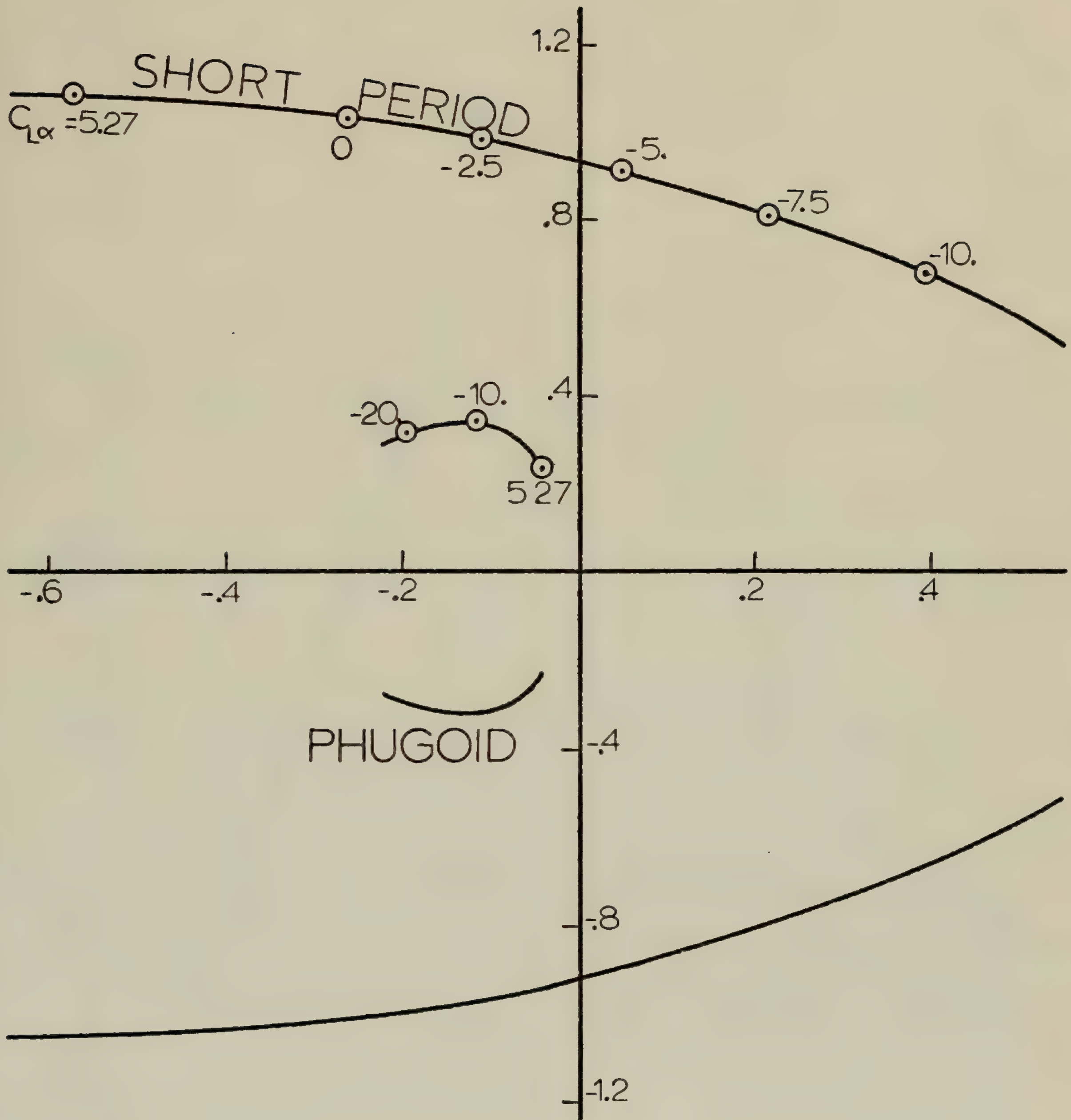


FIGURE 2.

ROOT LOCUS PLOT, VARYING $C_{L\alpha}$

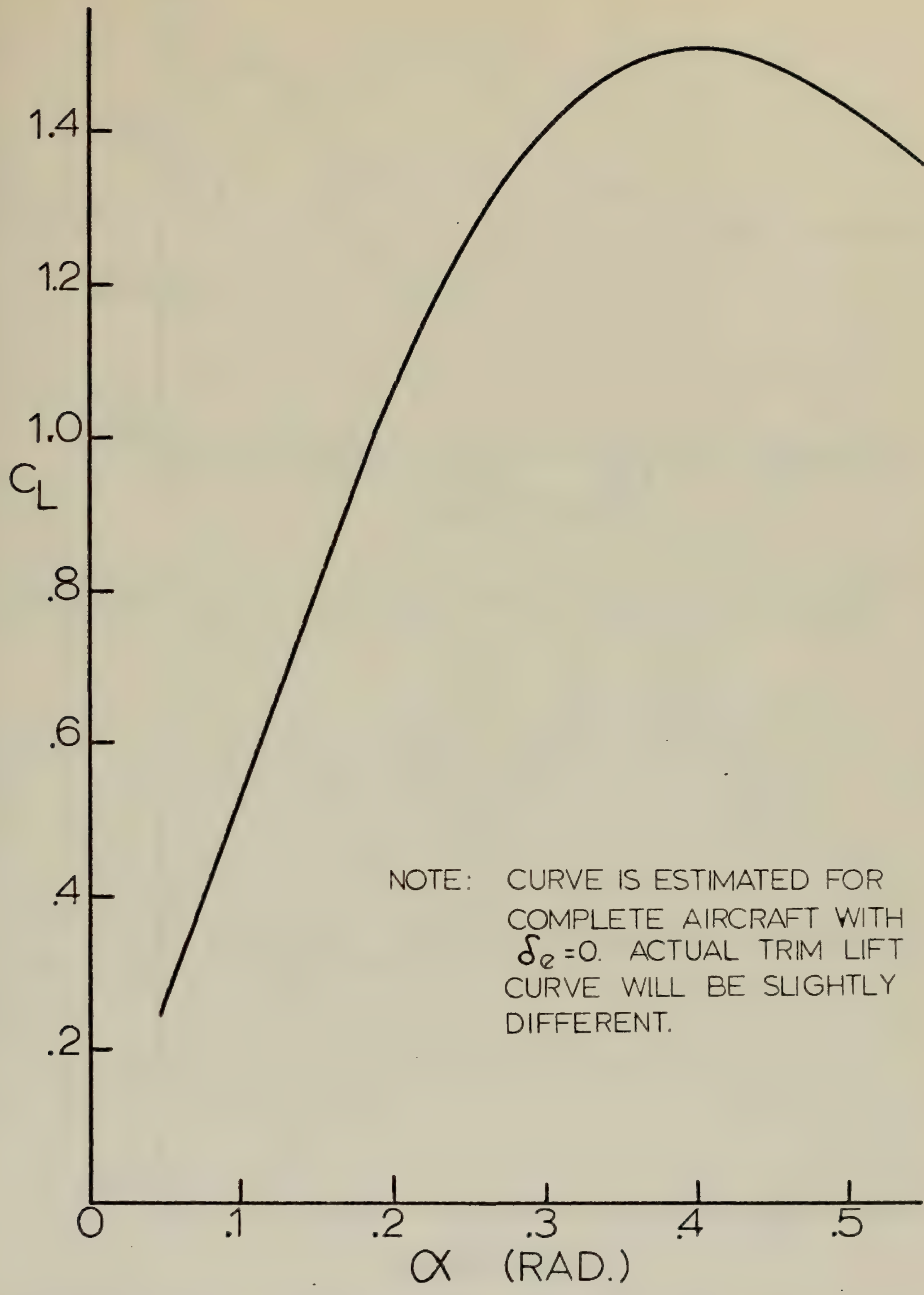


FIGURE 3a. C_L VERSUS α

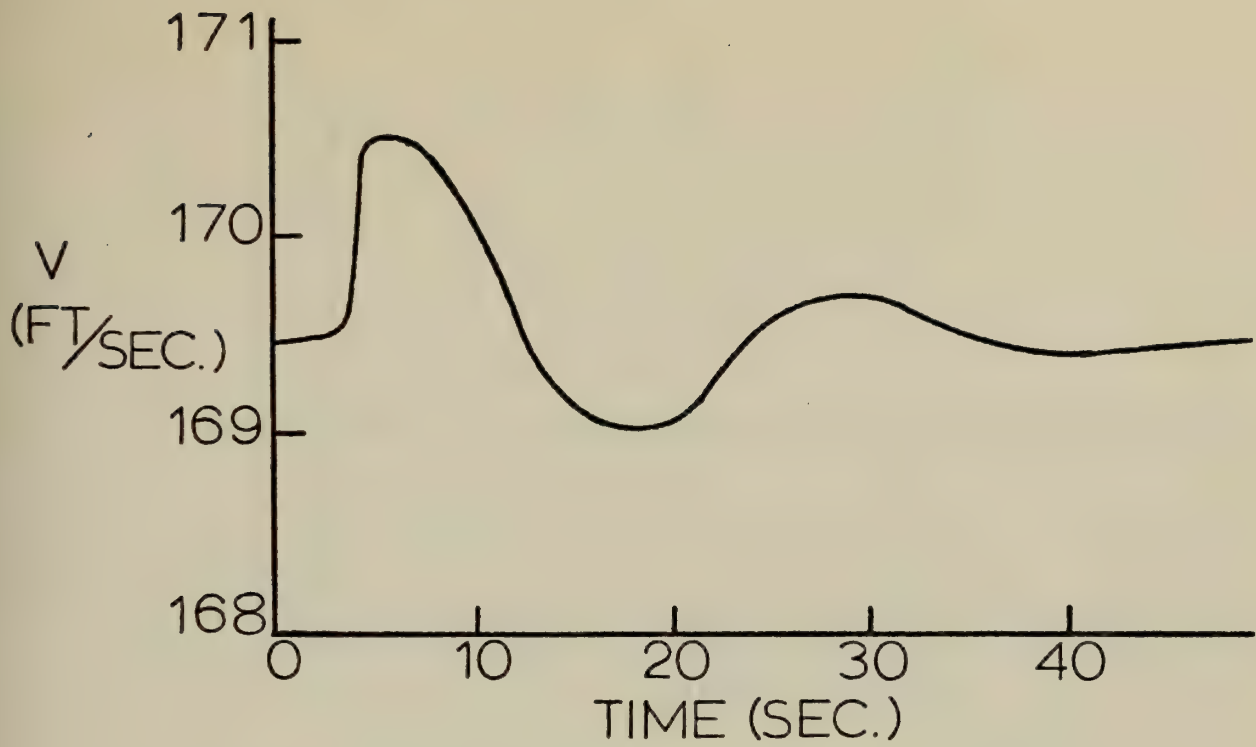


FIGURE 3b. VELOCITY VERSUS TIME

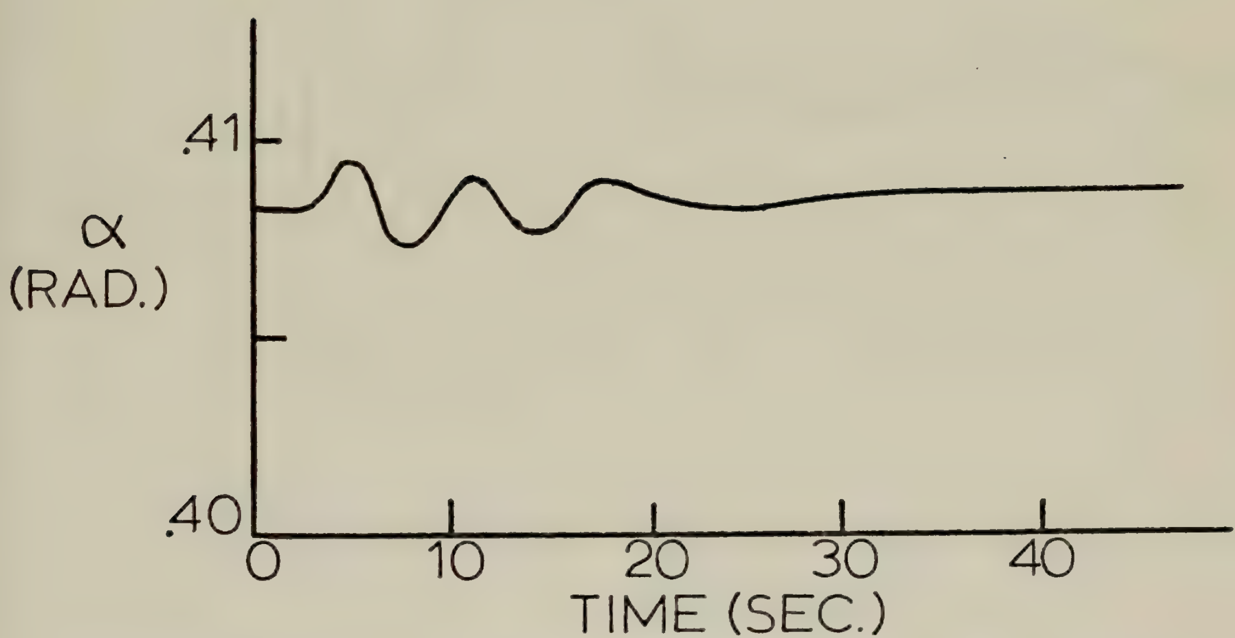


FIGURE 3c. ANGLE OF ATTACK VS. TIME

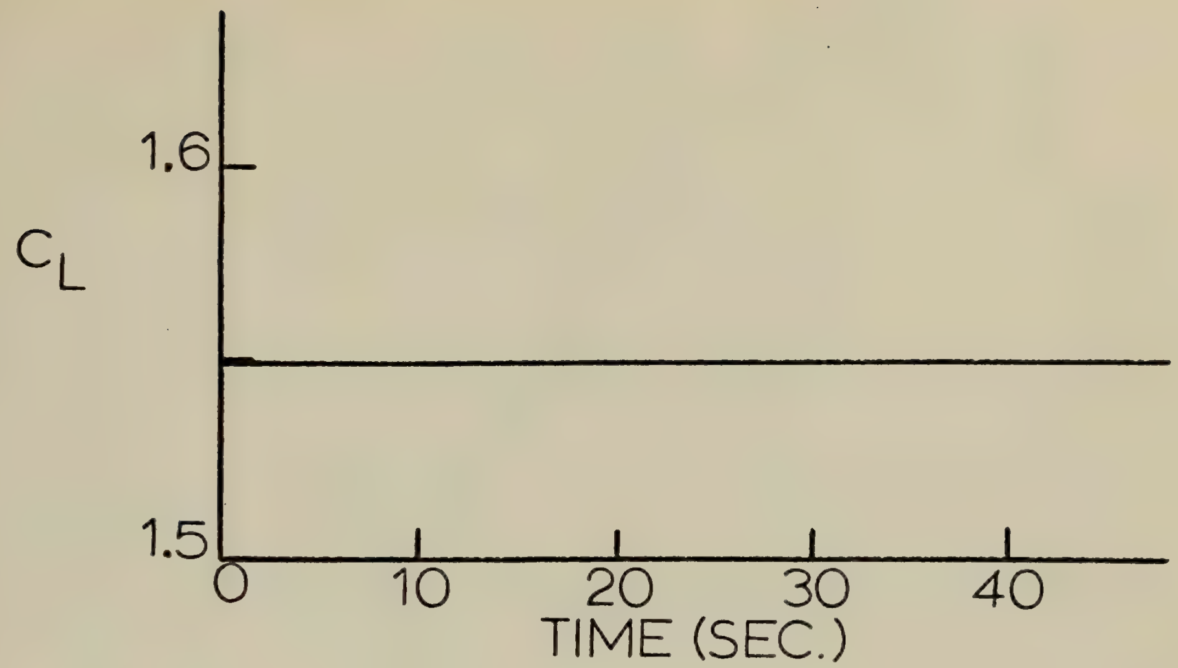


FIGURE 3d. LIFT COEFFICIENT VS. TIME

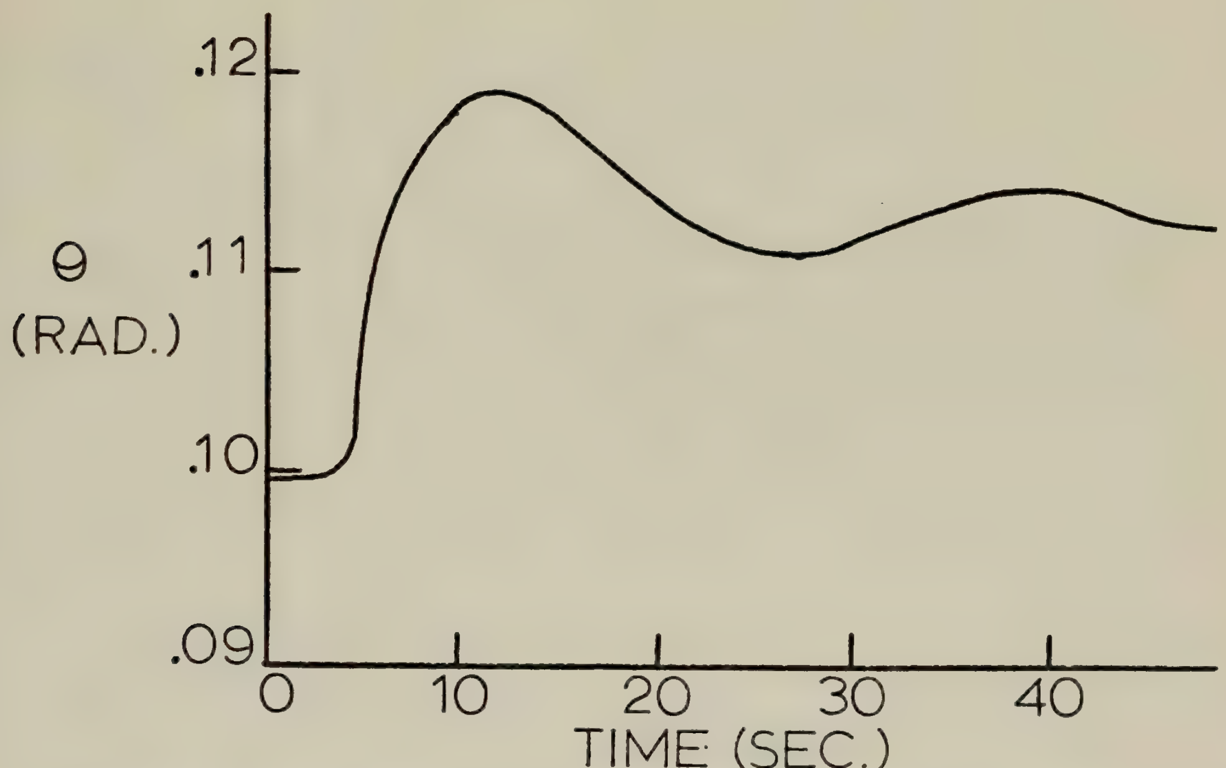


FIGURE 3e. PITCH ANGLE VS. TIME

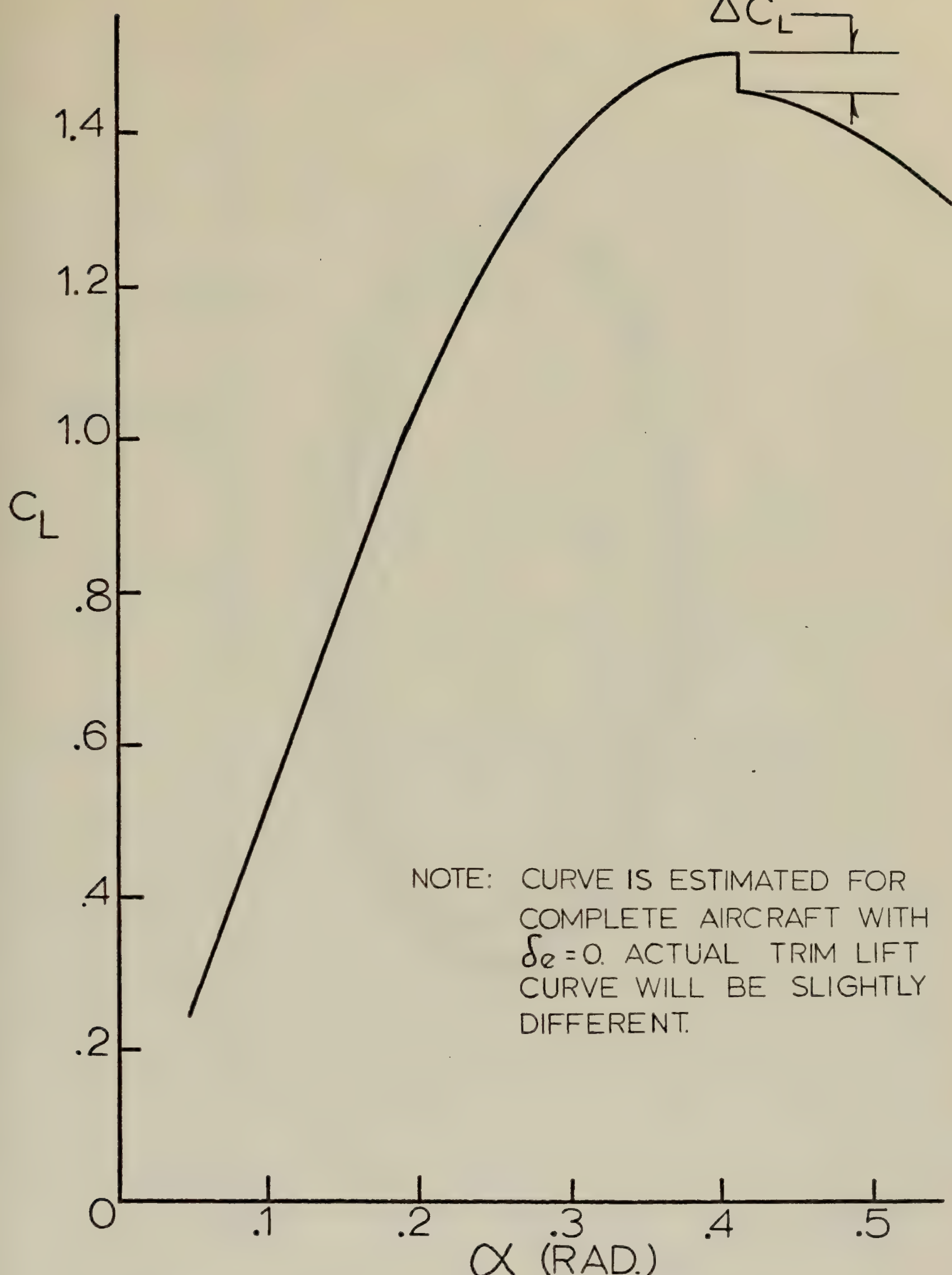


FIGURE 4. C_L VERSUS α

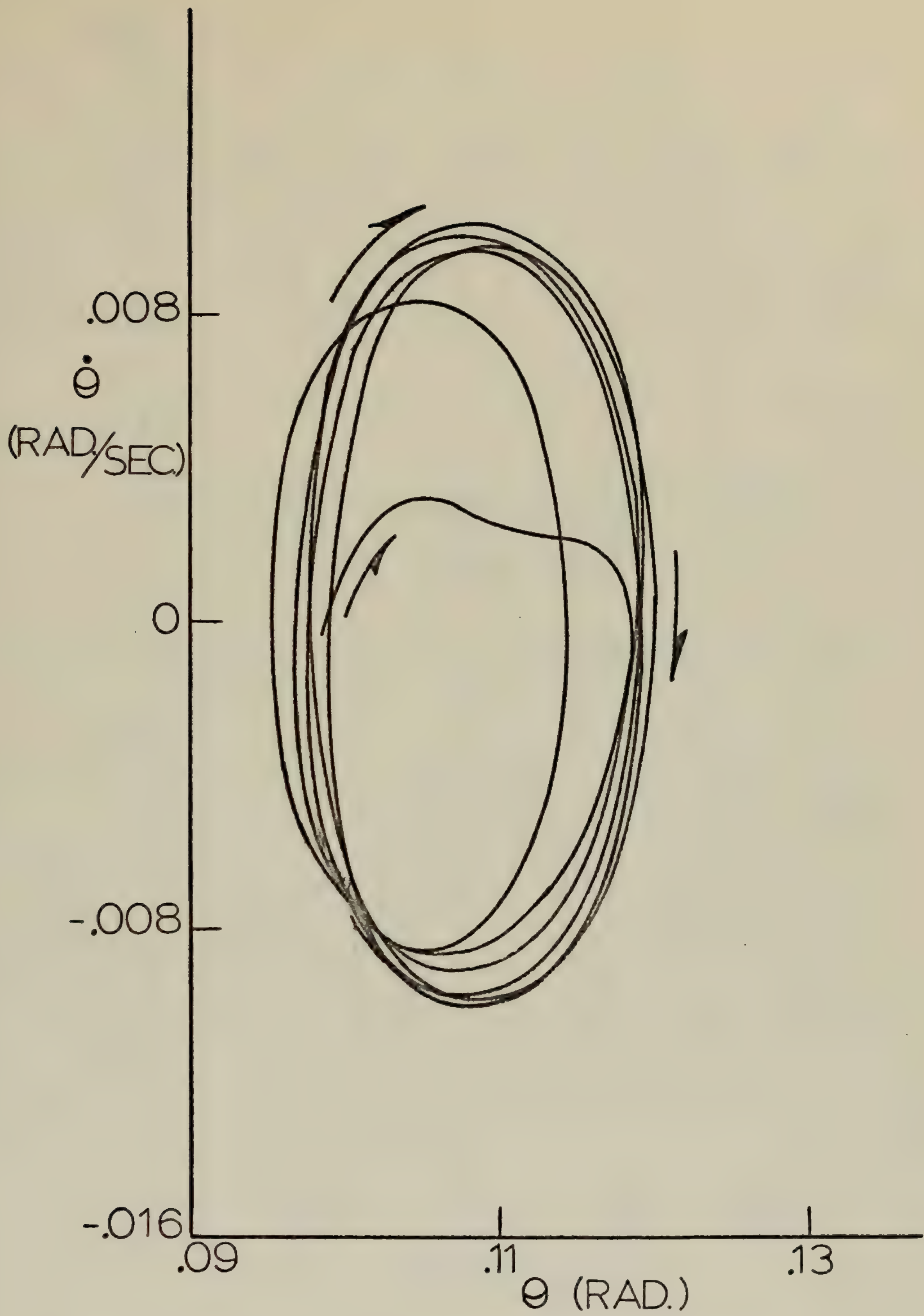


FIGURE 5a. PHASE PLANE

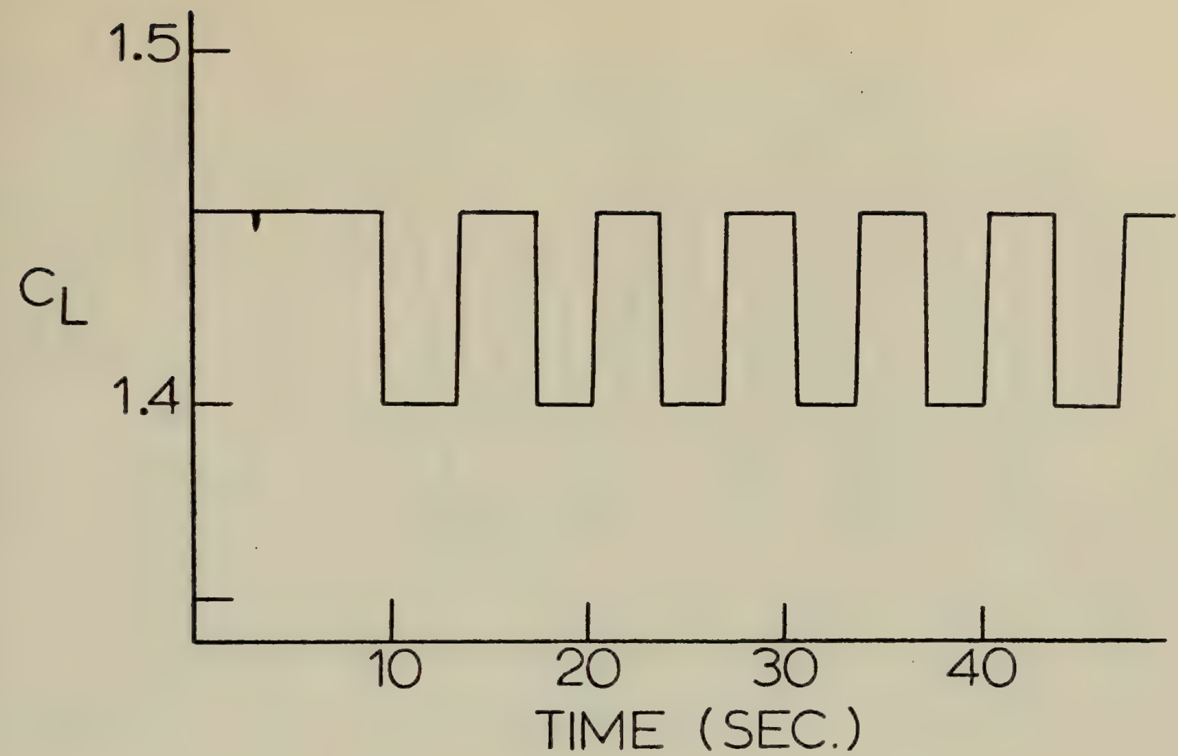


FIGURE 5b. C_L VERSUS TIME

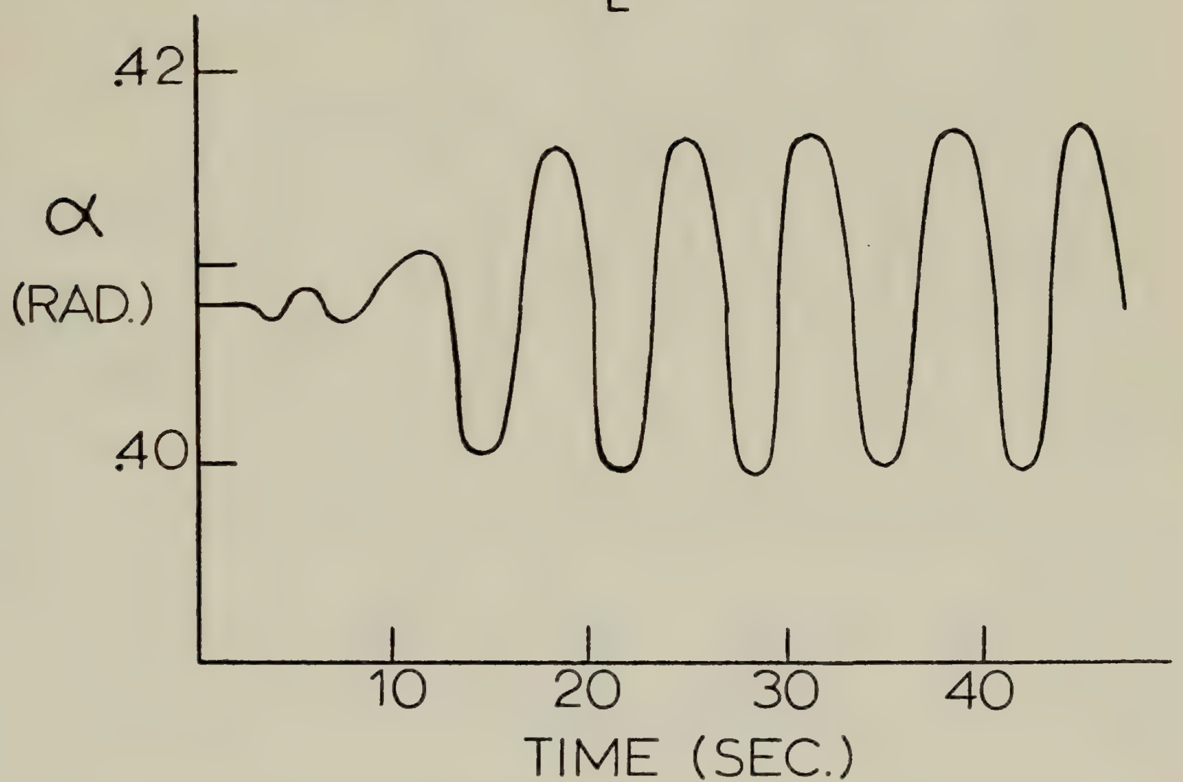


FIGURE 5c. ANGLE of ATTACK VS. TIME

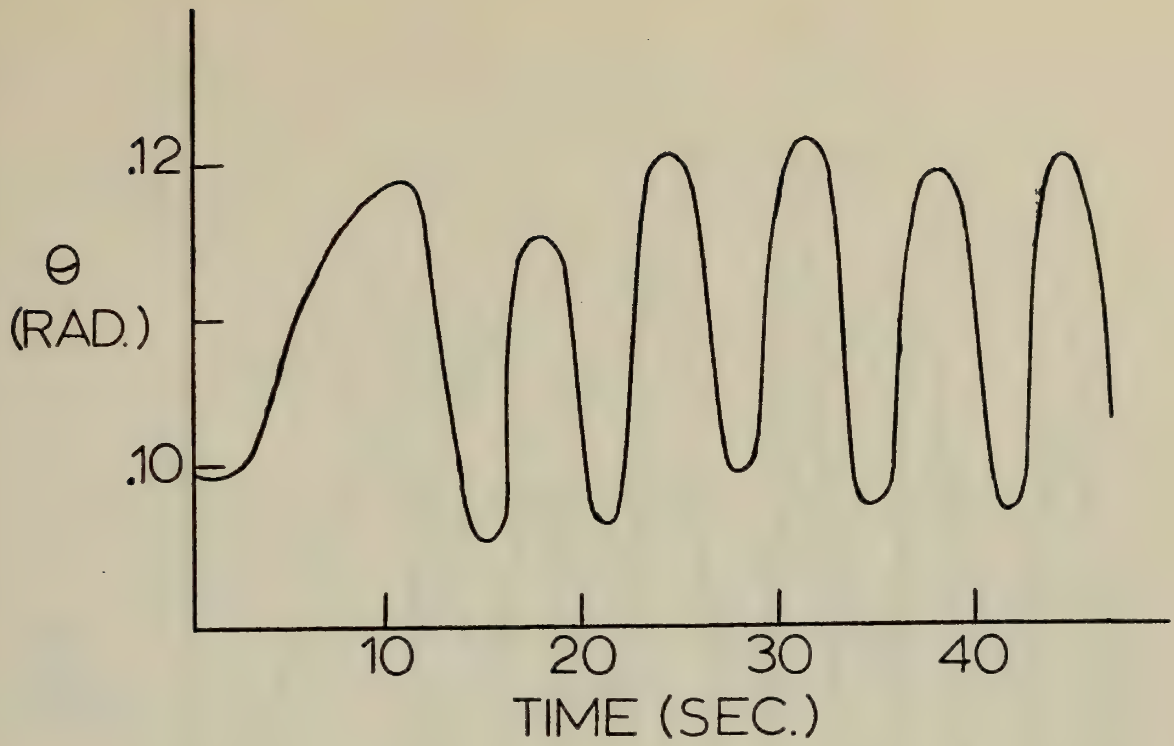


FIGURE 5d. PITCH ANGLE VERSUS TIME

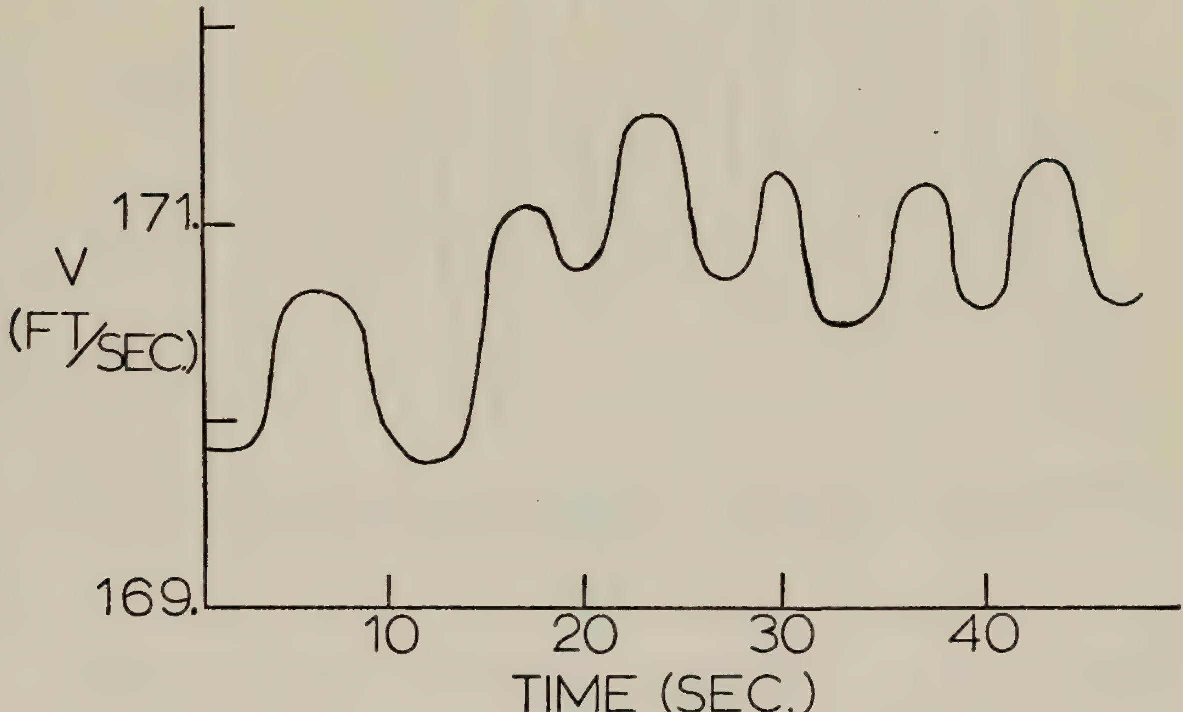


FIGURE 5e. VELOCITY VERSUS TIME

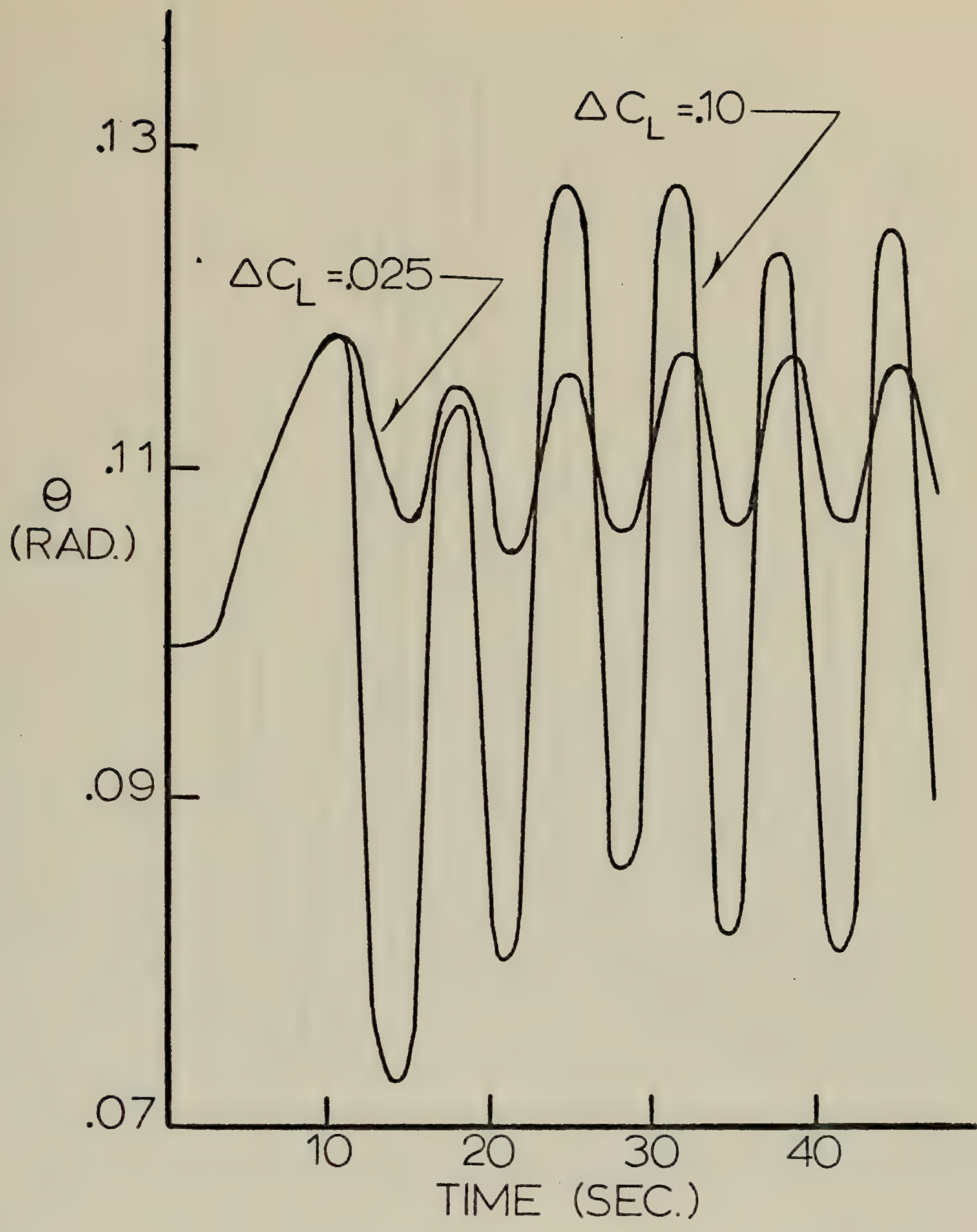


FIGURE 6. PITCH ANGLE VS. TIME FOR VARYING ΔC_L

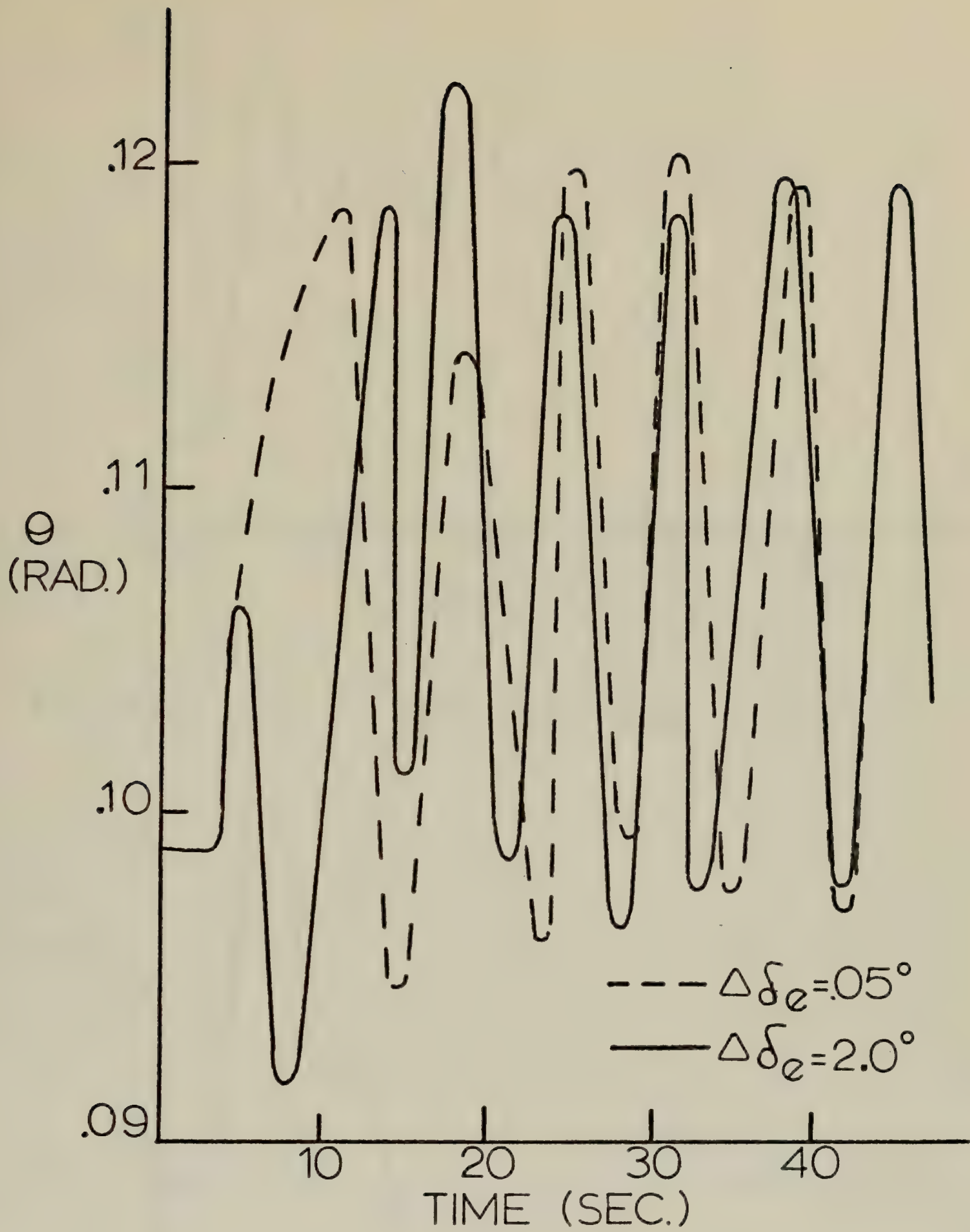


FIGURE 7. PITCH ANGLE VS. TIME
VARYING ELEVATOR IMPULSE

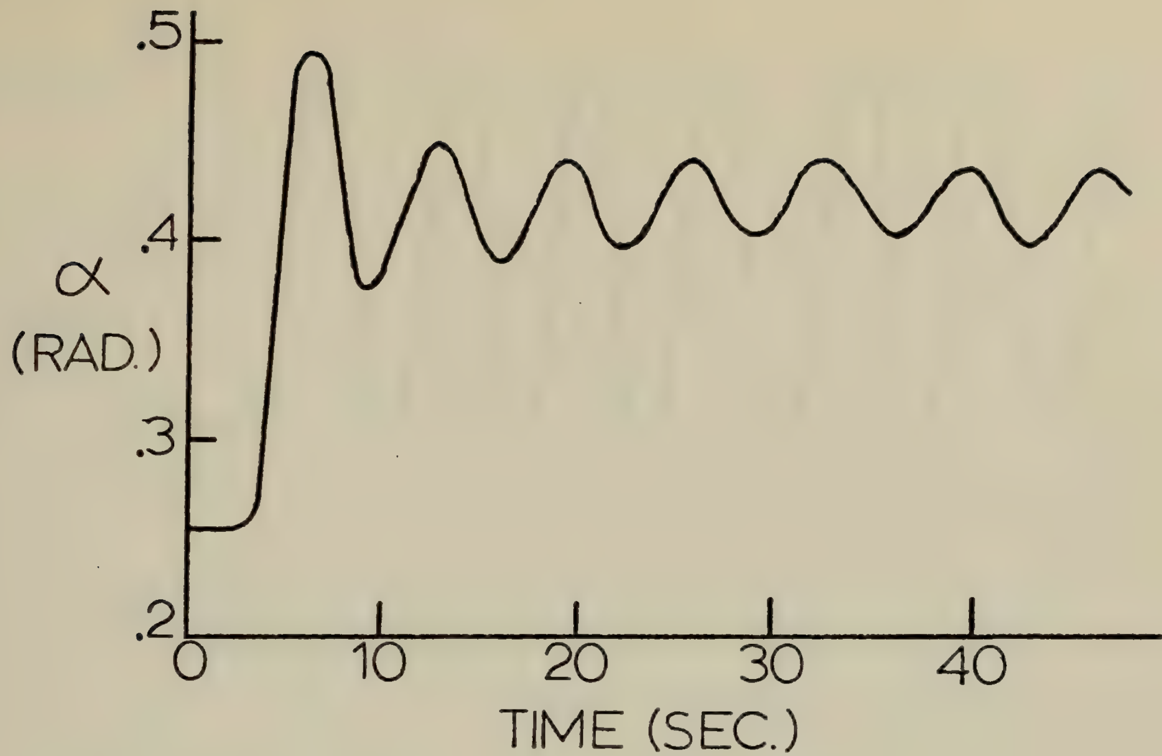


FIGURE 8a. α VERSUS TIME

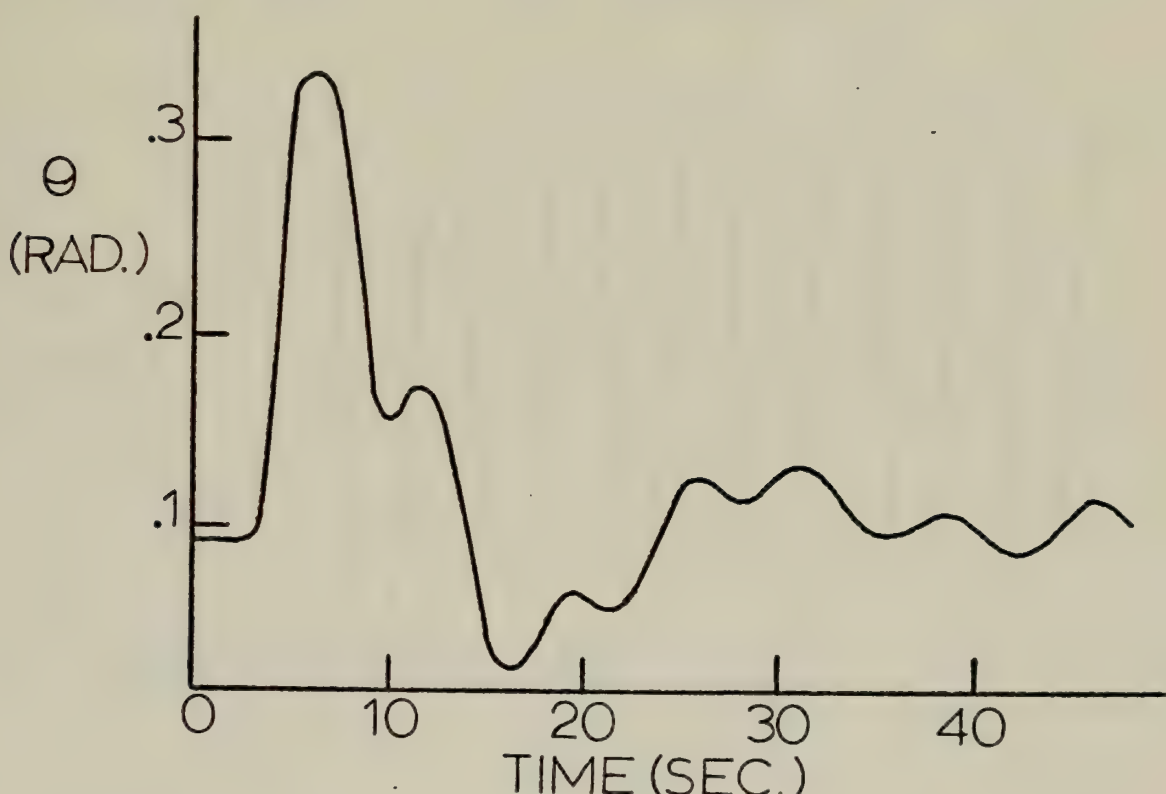


FIGURE 8b. θ VERSUS TIME

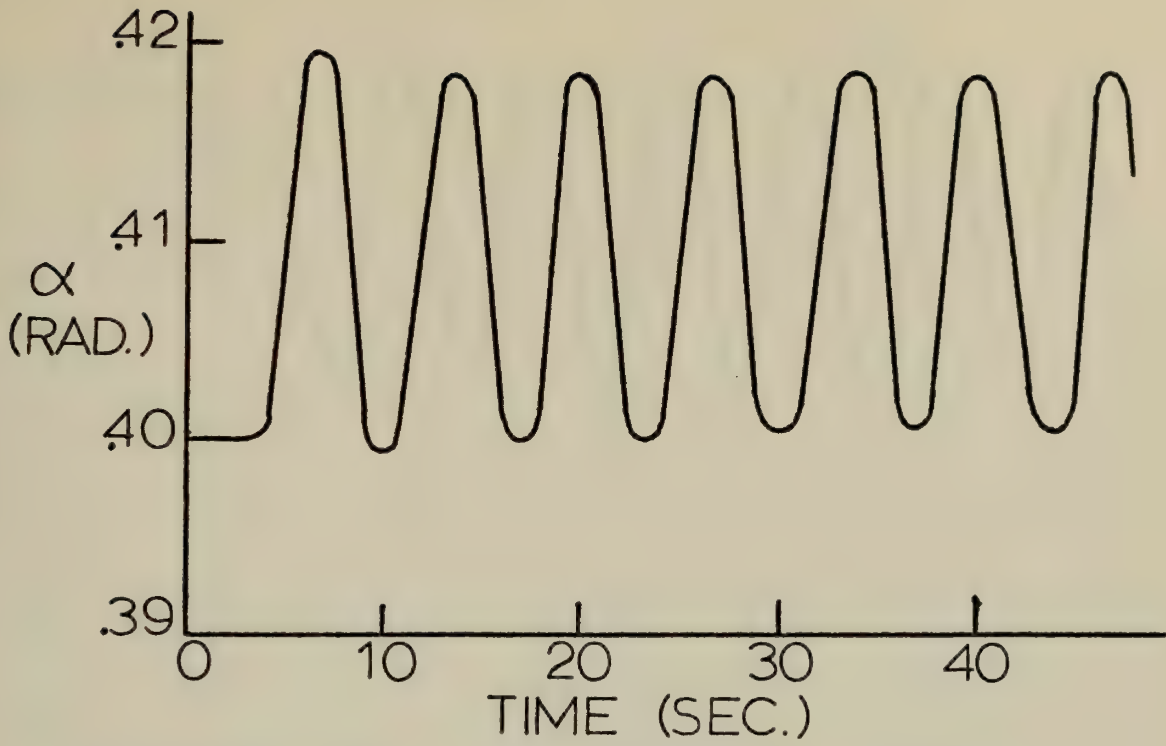


FIGURE 9a. α VERSUS TIME

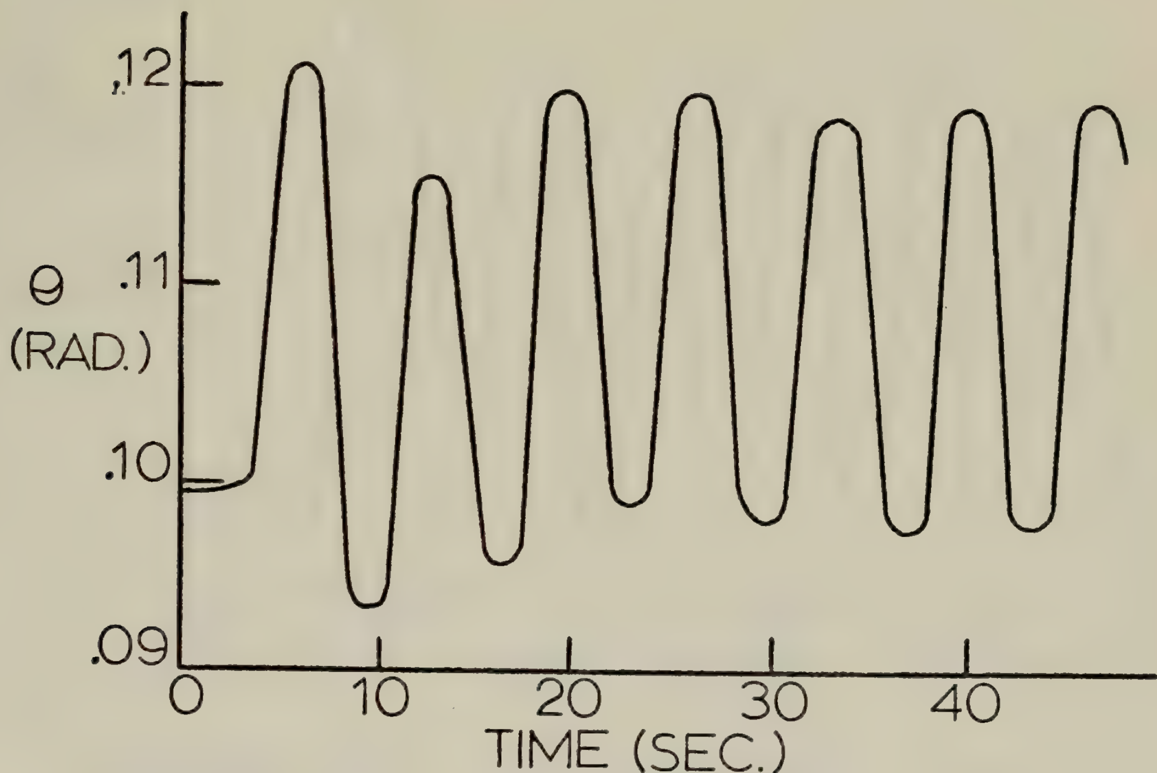


FIGURE 9b. θ VERSUS TIME

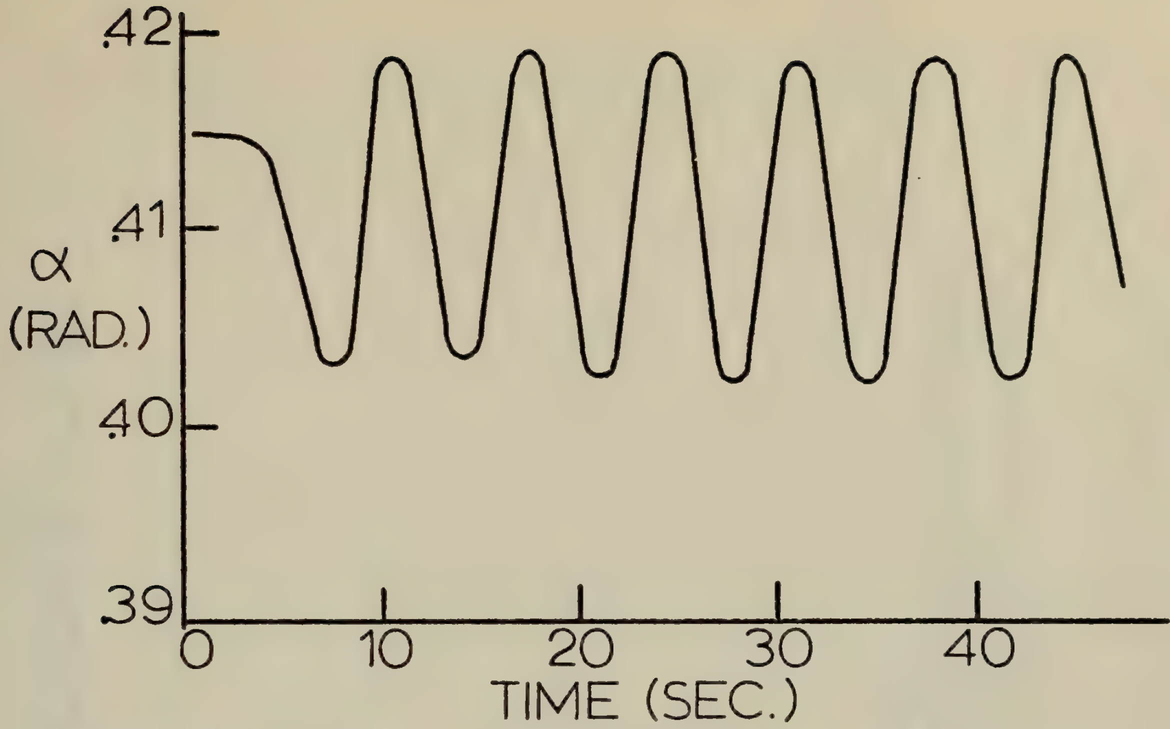


FIGURE 10a. α VERSUS TIME

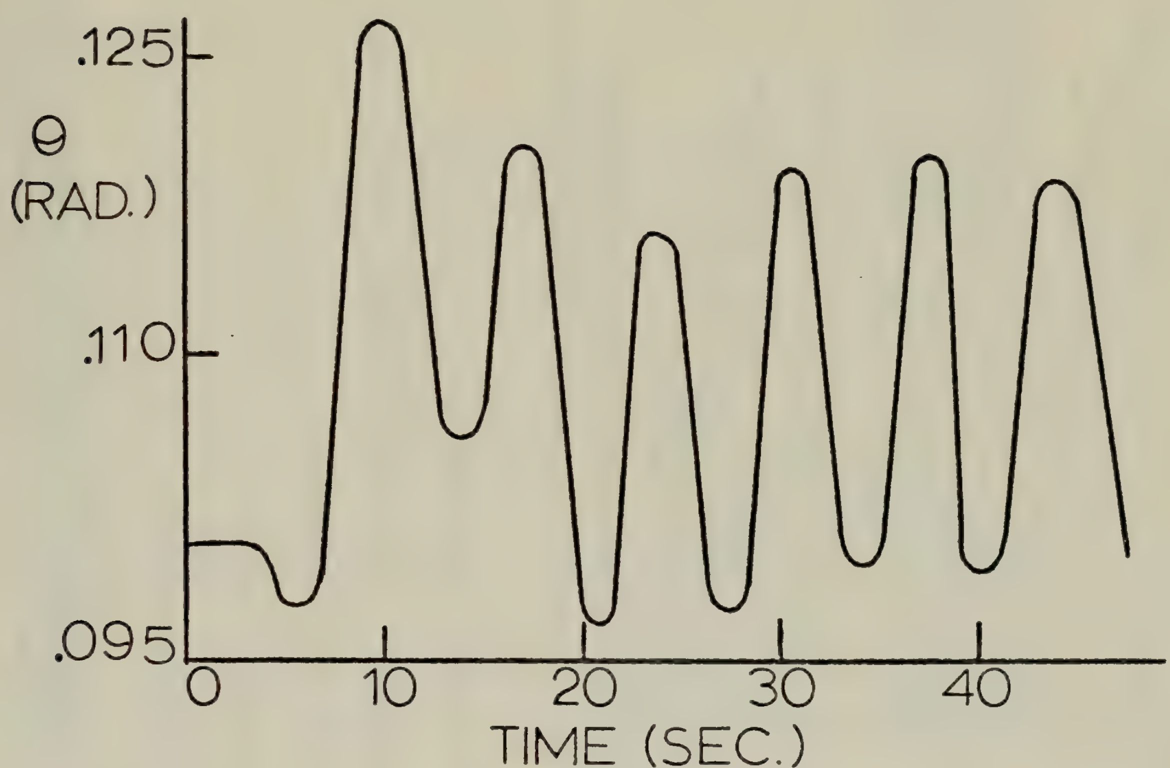


FIGURE 10b. θ VERSUS TIME

```
THIS PROGRAM PREDICTS THE LONGITUDINAL BEHAVIOR OF AN AIRCRAFT USING
WIND TUNNEL DATA.  A FOURTH ORDER RUNGE-KUTTA INTEGRATION SCHEME SOLVES
THE DIFFERENTIAL EQUATIONS OF MOTION. THE FOLLOWING FUNCTION SUBROUTINES
ARE USED BY THE RUNGE-KUTTA SCHEME:


FUNCTION F1= U-DOT


FUNCTION F2= W-DOT


FUNCTION F3= THETA-DOT


FUNCTION F4=  THETA-DOUBLE DOT


FUNCTION F5= ALPHA-DOT


SUBROUTINE  TRIM  DETERMINES THE ELEVATOR DEFLECTION,  DE.

THE FOLLOWING ARE DIMENSIONED QUANTITIES:
T(I)= REAL TIME
X1(I)= U VELOCITY COMPONENT
X2(I)= W VELOCITY COMPONENT
X3(I)= PITCH ANGLE, THETA, IN RADIANS
X4(I)= RATE OF CHANGE OF PITCH ANGLE
X5(I)= ANGLE OF ATTACK, ALPHA, IN RADIANS
H(I)= ALTITUDE IN FEET
HDOT(I)= RATE OF CHANGE OF ALTITUDE
ANFP(I)= FLIGHT PATH NORMAL ACCELERATION

      IMPLICIT REAL*8(A-H,K-Z)
      REAL*4 RANGE0,RANGE,RANGE1,RANGE2,RANGE3,RANGE4
      DIMENSION T(941),X1(941),X2(941),X3(941),X4(941),X5(941),VEL(941),
     1ANFP(941),H(941),ACL(941),ACD(941),ACM(941),DEL(941),CLP(941),RANG
     2E(4),RANGE1(4),RANGE2(4),RANGE3(4),RANGE0(4),RANGE4(4)
      COMMON CM,CL,CD,CZ,DE,BIY,CMTD,CMAD,CMDE,CBAR,V(14),Z1,Z2,XX(14),A
     1A,CLTD,CLDE,CT,G,RHO,S,X(14),Y(14),MA,CMA,TT,Z3,JM
      READ(5,19) I1,I2,I3,I4
      READ(5,1) TT,CLTD,CLDE,RHO,S,MA,JM
      READ(5,2) CMTD,CMAD,CMDE,BIY,CBAR

THE FOLLOWING ARRAYS ARE READ INTO THE PROGRAM TO BE USED BY SUBROUTINE
```

SPLIN1. SPLIN1 IS GIVEN 14 SETS OF VALUES TO BE USED AS ORDINATE AND ABSISSA FOR A TABLE OF DATA. THE ARRAYS ARE:
X= VALUES OF ANGLE OF ATTACK
Y= VALUES OF LIFT COEFFICIENT
V= VALUES OF DRAG COEFFICIENTS
XX= VALUES OF PITCHING MOMENT COEFFICIENT

SPLIN1 TAKES A GIVEN VALUE OF ANGLE OF ATTACH AND PROVIDES THE CORRESPONDING VALUE OF CL,CD AND CM, USING A CUBIC CURVE FITTING TECHNIQUE.

```
      READ(5,3) X
      READ(5,3) Y
      READ(5,3) V
      READ(5,3) XX
```

STEP SIZE HI USED IN THE RUNGE-KUTTA SCHEME IS IN REAL TIME (SECONDS).

```
      HI=0.5D-01
      G=32.174
      JJ=1
      IM=941
      IMM=IM-1
      Z3=0.0
```

AIRCRAFT ALTITUDE IS SET AT MEAN SEA LEVEL TO CORRESPOND WITH THE DENSITY ALTITUDE USED.

```
      H(1)=0
```

THE FOLLOWING VALUES OF 'RANGE' DEFINE THE SCALES FOR THE SIX OUTPUT GRAPHS.

```
      RANGE0(1)=0.500
      RANGE0(2)=0.100
      RANGE0(3)=1.700
      RANGE0(4)=0.500
      RANGE(1)=48.0
      RANGE(2)=0.0
      RANGE(3)=112.0
      RANGE(4)=88.0
      RANGE1(1)=48.0
      RANGE1(2)=0.0
      RANGE1(3)=0.5000
      RANGE1(4)=0.3500
      RANGE2(1)=48.0
      RANGE2(2)=0.0
      RANGE2(3)=1.7
```

```
      RANGE2(4)=1.1
      RANGE3(1)=48.0
      RANGE3(2)=0.0
      RANGE3(3)=2.3
      RANGE3(4)=1.1
      RANGE4(1)=48.0
      RANGE4(2)=0.0
      RANGE4(3)=0.130
      RANGE4(4)=0.070
```

THE INITIAL CONDITIONS ARE READ INTO THE PROGRAM.

```
      T(1)=0.0D0
      READ(5,4) W,AOA,THETA
```

ALL VALUES READ INTO THE PROGRAM ARE PRINTED OUT AS AN ECHO CHECK.

```
      WRITE(6,14)
      WRITE(6,5) TT,CLTD,CLDE,RHO,S,MA,JM,CMTD,CMAD,CMDE,BIY,CBAR,I1,
     1I2,I3,I4
      WRITE(6,6)
      WRITE(6,7)  (X(I),Y(I),V(I),XX(I), I=1,14)
      ATH=THETA-AOA
      IF(DABS(ATH).GT.0.1D-02) GO TO 600
      WRITE(6,8) AOA,W
```

THE INPUT DATA IS USED TO CALCULATE THE TRIM CONDITIONS FOR STEADY LEVEL FLIGHT. SUBROUTINE TRIM TAKES ANGLE OF ATTACK PLUS THE OTHER AIRCRAFT DATA AND CALCULATES THE CORRESPONDING VELOCITY, ELEVATOR ANGLE, THRUST, LIFT, DRAG AND MOMENT COEFFICIENTS. SUBROUTINE TRIM USES THE FORCE AND MOMENT EQUATIONS AT STATIC EQUILIBRIUM. THIS CALCULATED DATA IS THEN USED AS THE INITIAL CONDITIONS TO START THE RUNGE-KUTTA INTEGRATION SCHEME.

```
  110 CALL TRIM(W,THETA,AOA,B1,C1,D1,E1,FF,VLL,I1)
      WRITE(6,10)
      WRITE(6,11) B1,C1,VLL,D1,E1,FF,DE,CL,CM,CD,TT
      WRITE(6,20)
      CALL UTPLOT(X,Y,14,RANGE0,2,0)
      X1(1)=B1
      X2(1)=C1
      X3(1)=D1
      X4(1)=E1
      X5(1)=FF
      DEL(1)=DE
      ACL(1)=CL
      ACM(1)=CM
      ACD(1)=CD
```

```
      A=T(1)
      B=X1(1)
      C=X2(1)
      D=X3(1)
      E=X4(1)
      F=X5(1)
      WRITE(6,12)
      DELTT=(TT-250.0)/24.0
      IF(DELTT) 112,112,113
  112 DELTT=0.0
  113 DO 200 I=1,IMM
      IF(I.GE.25) GO TO 140
      IF(I1.EQ.1) GO TO 140
      IF(I1.EQ.2) GO TO 120
      IF(I1.EQ.3) GO TO 130
  120 TT=0.0
      GO TO 140
  130 TT=TT-DELTT
  140 IF(I4.EQ.1) GO TO 190
      IF(I.LE.80) GO TO 190
      XVEL=X1(I)-X1(I+1)
      IF(XVEL) 150,190,190
  150 IF(I4.GE.3) GO TO 160
      I4=I+60
  160 IF(I.LT.I4) GO TO 190
      IF(JJ.GE.25) GO TO 190
      TT=TT+DELTT
      JJ=JJ+1
  190 CALL RUNKUT(A,B,C,D,E,F,B1,C1,D1,E1,FF)
      X1(I+1)=B1
      X2(I+1)=C1
      X3(I+1)=D1
      X4(I+1)=E1
      X5(I+1)=FF
      T(I+1)=T(I)+HI
      A=T(I+1)
      B=X1(I+1)
      C=X2(I+1)
      D=X3(I+1)
      E=X4(I+1)
      F=X5(I+1)
      DEL(I+1)=DE
      ACL(I+1)=CL
      ACM(I+1)=CM
      ACD(I+1)=CD
```

AT THIS POINT THE DESIRED ELEVATOR MANIPULATION IS INSERTED USING THE APPROPRIATE LOGIC STATEMENTS.

```
AN ELEVATOR IMPULSE OF 1/2 DEGREE IS INSERTED FOR  1/20 SECOND.

      IF((A.GE.2.980).AND.(A.LE.3.02)) GO TO 191
      IF ((A.GE.3.020).AND.(A.LE.3.06)) GO TO 195
      GO TO 200
  191 DE=DE-0.0087250
      GO TO 200
  195 DE=DE+0.0087250
  200 CONTINUE

THE RESULTANT AIRCRAFT VELOCITY, NORMAL FLIGHT PATH ACCELERATION,
ACTUAL LIFT COEFFICIENT AND ALTITUDE IS CALCULATED FOR EACH TIME STEP.

      DO 300 I=1,IM
      VEL(I)=DSQRT(X1(I)*X1(I)+X2(I)*X2(I))
      ANFP(I)=((VEL(I)*X4(I))/G)+DCOS(X3(I)-X5(I))
      CLP(I)=ACL(I)/ANFP(I)
      HDOT=VEL(I)*DSIN(X3(I)-X5(I))*101.3364
      IF(I.EQ.IM) GO TO 300
      H(I+1)=H(I)+(HDOT*(T(I+1)-T(I))/60.0)
  300 CONTINUE
      J=75
      DO 410 I=1,IM
      IF(I.EQ.J) GO TO 420
  400 WRITE(6,13)  T(I),X1(I),X2(I),VEL(I),X3(I),X4(I),X5(I),DEL(I),ACL(
     1I),CLP(I),ACM(I),ACD(I),ANFP(I),H(I)
  410 CONTINUE
      GO TO 450
  420 WRITE(6,12)
      J=J+75
      GO TO 400
  450 WRITE(6,15)
      DO 500 I=1,IM
      VEL(I)=VEL(I)*0.592086
  500 CONTINUE
      CALL UTPLOT(T,VEL,941,RANGE,2,0)
      WRITE(6,16)
      CALL UTPLOT(T,X5,941,RANGE1,2,0)
      WRITE(6,17)
      CALL UTPLOT(T,ACL,941,RANGE2,2,0)
      WRITE(6,18)
      CALL UTPLOT(T,CLP,941,RANGE3,2,0)
      WRITE(6,21)
      CALL UTPLOT(T,X3,941,RANGE4,2,0)
      GO TO 1000
  600 WRITE(6,9) AOA,THETA,W
      GO TO 110
```

```
    1 FORMAT(F10.3,5F10.5,I3)
    2 FORMAT(3F10.5,F10.2,F10.5)
    3 FORMAT(7F10.7)
    4 FORMAT(F10.2,F10.6,F10.6)
    5 FORMAT(T55,'INPUT DATA',//,T20,'TT    =',T26,F10.3,T40,'CLTD =',T46
     1,F9.6,T60,'CLDE =',T66,F7.4,T80,'RHO  =',T86,F10.7,//,T20,'S    ='
     2,T26,F7.2,T40,'MASS =',T46,F7.2,T60,'JM   =',T66,I3,T80,'CMTD =',T
     386,F9.6,//,T20,'CMAD =',T26,F9.6,T40,'CMDE =',T46,F7.4,T60,'BIY  =
     4',T66,F9.2,T80,'CBAR =',T86,F5.2,//,T20,'I1   =',T26,I2,T40,'I2
     5=',T46,I2,T60,'I3   =',T66,I2,T80,'I4   =',T86,I2)
    6 FORMAT(//,T51,'DATA USED BY SPLIN IN TABLE LOOK UP',//,T18,'ANGLE
     1OF ATTACK',T55,'CL',T85,'CD',T114,'CM',//)
    7 FORMAT('0',T18,F12.6,T48,F12.6,T78,F12.6,T108,F12.6)
    8 FORMAT(///,T40,'INPUT DATA',//,T20,'ANGLE OF ATTACK = PITCH ANGLE
     1=',T52,F8.5,T65,'(AIRCRAFT IN LEVEL FLIGHT)',//,T20,'AIRCRAFT WEIG
     2HT =  ',T38,F9.2)
    9 FORMAT(///,T61,'INPUT DATA',//,T52,'ANGLE OF ATTACK =',T70,F8.5,
     1//,T52,'PITCH ANGLE =',T70,F8.5,//,T52,'AIRCRAFT WEIGHT =',T70,
     2F9.2)
   10 FORMAT(////,T18,'FOR TRIMMED LEVEL FLIGHT, THE AIRCRAFT PARAMETERS
     1 HAVE THE FOLLOWING VALUES.',//,T3,'X VEL',T14,'Z VEL',T23,
     2'A/C VEL',
     3         T38,'THETA',T50,'THETA DOT',T66,'AOA',T75,'ELEV. ANGLE',T9
     44,'CL',T108,'CM',T122,'CD',//)
   11 FORMAT(T1,F8.3,T12,F8.3,T23,F8.3,
     1                             T33,F12.4,T47,F10.5,T61,F10.5,T75,F10.7,
     2T89,F10.7,T103,F10.7,T117,F10.7,///,T38,'THRUST FOR LEVEL FLIGHT =
     3',T64,F8.2)
   12 FORMAT ('1',T2,'TIME',T12,'X VEL',T22,'Z VEL',T31,'A/C VEL',T43,'T
     1HETA',T50,'THETA DOT',T64,'AOA',T74,'DE',T85,'CL',T92,'CL-*',T101,
     2'CM',T111,'CD',T119,'ANFP',T128,'ALT',//)
   13 FORMAT(F7.3,T10,F8.3,T20,F8.3,T30,F8.3,T41,F8.5,T51,F8.5,T61,F8.5,
     1T71,F8.5,T81,F7.4,T90,F7.4,T99,F7.4,T108,F7.4,T117,F7.4,T126,F7.1)
   14 FORMAT('1')
   15 FORMAT('1',///,T34,'RESULTANT AIRCRAFT VELOCITY(KTS.) VS. TIME',//
     1/)
   16 FORMAT('1',///,T41,'AIRCRAFT AOA VS. TIME',////)
   17 FORMAT('1',///,T43,'AIRCRAFT  CL  VS. TIME',////)
   18 FORMAT('1',///,T30,'AIRCRAFT CL-* (BASED ON NORMAL FLIGHT PATH ACC
     1EL.) VS. TIME',////)
   19 FORMAT(4I2)
   20 FORMAT('1',///,T20,'CL VS AOA (TABLE LOOK-UP DATA)',///)
   21 FORMAT('1',///,T30,'THETA VS. TIME',///)
 1000 STOP
      END
```

```
      SUBROUTINE RUNKUT(A,B,C,D,E,F,B1,C1,D1,E1,FF)
      IMPLICIT REAL*8(A-H,K-Z)
      HI=0.5D-01
      K1=HI*F1(A,B,C,D,E,F)
      L1=HI*F2(A,B,C,D,E,F)
      M1=HI*F3(A,B,C,D,E,F)
      N1=HI*F4(A,B,C,D,E,F)
      P1=HI*F5(A,B,C,D,E,F)
      K2=HI*F1(A+HI/2.0,B+K1/2.0,C+L1/2.0,D+M1/2.0,E+N1/2.0,F+P1/2.0)
      L2=HI*F2(A+HI/2.0,B+K1/2.0,C+L1/2.0,D+M1/2.0,E+N1/2.0,F+P1/2.0)
      M2=HI*F3(A+HI/2.0,B+K1/2.0,C+L1/2.0,D+M1/2.0,E+N1/2.0,F+P1/2.0)
      N2=HI*F4(A+HI/2.0,B+K1/2.0,C+L1/2.0,D+M1/2.0,E+N1/2.0,F+P1/2.0)
      P2=HI*F5(A+HI/2.0,B+K1/2.0,C+L1/2.0,D+M1/2.0,E+N1/2.0,F+P1/2.0)
      K3=HI*F1(A+HI/2.0,B+K2/2.0,C+L2/2.0,D+M2/2.0,E+N2/2.0,F+P2/2.0)
      L3=HI*F2(A+HI/2.0,B+K2/2.0,C+L2/2.0,D+M2/2.0,E+N2/2.0,F+P2/2.0)
      M3=HI*F3(A+HI/2.0,B+K2/2.0,C+L2/2.0,D+M2/2.0,E+N2/2.0,F+P2/2.0)
      N3=HI*F4(A+HI/2.0,B+K2/2.0,C+L2/2.0,D+M2/2.0,E+N2/2.0,F+P2/2.0)
      P3=HI*F5(A+HI/2.0,B+K2/2.0,C+L2/2.0,D+M2/2.0,E+N2/2.0,F+P2/2.0)
      K4=HI*F1(A+HI,B+K3,C+L3,D+M3,E+N3,F+P3)
      L4=HI*F2(A+HI,B+K3,C+L3,D+M3,E+N3,F+P3)
      M4=HI*F3(A+HI,B+K3,C+L3,D+M3,E+N3,F+P3)
      N4=HI*F4(A+HI,B+K3,C+L3,D+M3,E+N3,F+P3)
      P4=HI*F5(A+HI,B+K3,C+L3,D+M3,E+N3,F+P3)
      B1=B+(K1+2.0*K2+2.0*K3+K4)/6.0
      C1=C+(L1+2.0*L2+2.0*L3+L4)/6.0
      D1=D+(M1+2.0*M2+2.0*M3+M4)/6.0
      E1=E+(N1+2.0*N2+2.0*N3+N4)/6.0
      FF=F+(P1+2.0*P2+2.0*P3+P4)/6.0
      RETURN
      END


      FUNCTION F1(T,X1,X2,X3,X4,X5)
      IMPLICIT REAL*8(A-H,K-Z)
      COMMON CM,CL,CD,CZ,DE,BIY,CMTD,CMAD,CMDE,CBAR,V(14),Z1,Z2,XX(14),A
     1A,CLTD,CLDE,CT,G,RHO,S,X(14),Y(14),MA,CMA,TT,Z3,JM
      AA=(X1*X1+X2*X2)
      CALL SPLIN1(X,Y,JM,X5,CLA)
      CALL SPLIN1(X,XX,JM,X5,CMA)
      CALL SPLIN1(X,V,JM,X5,CD)
      CL=CLA+CLTD*0.5*CBAR*X4/DSQRT(AA)+CLDE*DE

LOGIC STATEMENTS  TO INCLUDE DELTA CL ARE INSERTED HERE.

      CT=(2.0*TT)/(RHO*AA*S)
      CX=CT+CL*DSIN(X5)-CD*DCOS(X5)
      CZ=(-1.0*(CL*DCOS(X5)+CD*DSIN(X5)))
      F1=((RHO*AA*S)/(2.0*MA))*CX-G*DSIN(X3)-X2*X4
```

```
      Z1=F1
   10 RETURN
      END

      FUNCTION F2(T,X1,X2,X3,X4,X5)
      IMPLICIT REAL*8(A-H,K-Z)
      COMMON CM,CL,CD,CZ,DE,BIY,CMTD,CMAD,CMDE,CBAR,V(14),Z1,Z2,XX(14),A
     1A,CLTD,CLDE,CT,G,RHO,S,X(14),Y(14),MA,CMA,TT,Z3,JM
      F2=((RHO*AA*S)/(2.0*MA))*CZ+G*DCOS(X3)+X1*X4
      Z2=F2
   10 RETURN
      END

      FUNCTION F3(T,X1,X2,X3,X4,X5)
      IMPLICIT REAL*8(A-H,K-Z)
      F3=X4
   10 RETURN
      END

      FUNCTION F4(T,X1,X2,X3,X4,X5)
      IMPLICIT REAL*8(A-H,K-Z)
      COMMON CM,CL,CD,CZ,DE,BIY,CMTD,CMAD,CMDE,CBAR,V(14),Z1,Z2,XX(14),A
     1A,CLTD,CLDE,CT,G,RHO,S,X(14),Y(14),MA,CMA,TT,Z3,JM
      CM=CMA+(CMTD*0.5*CBAR*X4)/DSQRT(AA)+CMAD*((Z2*DCOS(X5)-Z1*DSIN(X5)
     1)*0.5*CBAR/AA)+CMDE*DE
      F4=((RHO*AA*S*CBAR)/(2.0*BIY))*CM
   10 RETURN
      END

      FUNCTION F5(T,X1,X2,X3,X4,X5)
      IMPLICIT REAL*8(A-H,K-Z)
      COMMON CM,CL,CD,CZ,DE,BIY,CMTD,CMAD,CMDE,CBAR,V(14),Z1,Z2,XX(14),A
     1A,CLTD,CLDE,CT,G,RHO,S,X(14),Y(14),MA,CMA,TT,Z3,JM
      F5=(Z2*DCOS(X5)-Z1*DSIN(X5))/DSQRT(AA)
      Z3=F5
   10 RETURN
      END

      SUBROUTINE TRIM(W,THETA,AOA,B1,C1,D1,E1,FF,VLL,I1)
      IMPLICIT REAL*8(A-H,K-Z)
      COMMON CM,CL,CD,CZ,DE,BIY,CMTD,CMAD,CMDE,CBAR,V(14),Z1,Z2,XX(14),A
     1A,CLTD,CLDE,CT,G,RHO,S,X(14),Y(14),MA,CMA,TT,Z3,JM
      X5=AOA
```

```
      CM=0.0
      CALL SPLIN1(X,Y,JM,X5,CLA)
      CALL SPLIN1(X,XX,JM,X5,CMA)
      CALL SPLIN1(X,V,JM,X5,CD)
      DE=-1.0*(CMA/CMDE)
      CL=CLA+CLDE*DE
LOGIC STATEMENTS TO INCLUDE DELTA CL  ARE INSERTED HERE.
      AT=THETA-AOA
      IF(AT) 1,2,2
    1 AT=AOA-THETA
    2 IF(I1.EQ.2) GO TO 3
      SAT=DSIN(AT)
      CAT=DCOS(AT)
      SA=DSIN(AOA)
      CA=DCOS(AOA)
      NUM1=W*(CAT*CA-SAT*SA)
      DEN1=S*(CL*CA+CD*SA)
      Q=NUM1/DEN1
      LD=CL/CD
      NUM2=W*(LD*SAT+CAT)
      DEN2=LD*CA+SA
      TT=NUM2/DEN2
      GO TO 4
    3 Q=(W*DCOS(AT))/(CL*S)
      TT=0.0
    4 VX=(2.0*Q)/RHO
      VLL=DSQRT(VX)
      B1=VLL*DCOS(X5)
      C1=VLL*DSIN(X5)
      D1=THETA
      E1=0.0
      FF=X5
      RETURN
      END

      SUBROUTINE SPLIN1(X,Y,M,XINT,YINT)
      IMPLICIT REAL*8 (A-H),REAL*8 (O-Z)
      DIMENSION X(M),Y(M),C(4,30)
      CALL SPLICO(X,Y,M,C)
      K=1
      ENTRY SPLINN(X,Y,M,XINT,YINT)
    1 IF(XINT-X(1)) 2,3,4
    2 K=1
      GO TO 11
    3 YINT=Y(1)
```

```
      RETURN
    4 IF(XINT-X(K+1))8,5,6
    5 YINT=Y(K+1)
      RETURN
    6 K=K+1
      IF(M-K) 7,7,1
    7 K=M-1
      GO TO 11
    8 IF(XINT-X(K))9,10,13
    9 YINT=Y(K)
      RETURN
   10 K=K-1
      GO TO 8
   11 PRINT 12,XINT
   12 FORMAT(8HOXINT = E18.9,32H, OUT OF RANGE FOR INTERPOLATION)
   13 YINT=(X(K+1)-XINT)*(C(1,K)*(X(K+1)-XINT)**2+C(3,K))
      YINT=YINT+(XINT-X(K))*(C(2,K)*(XINT-X(K))**2+C(4,K))
      RETURN
      END


      SUBROUTINE SPLICO(X,Y,M,C)
      IMPLICIT REAL*8 (A-H),REAL*8 (O-Z)
      DIMENSION X(M),Y(M),C(4,30),D(30),P(30),E(30),A(30,3),B(30),Z(30)
      MM=M-1
      DO 2 K=1,MM
      D(K)=X(K+1)-X(K)
      P(K)=D(K)/6.
    2 E(K)=(Y(K+1)-Y(K))/D(K)
      DO 3 K=2,MM
    3 B(K)=E(K)-E(K-1)
      A(1,2)=-1.-D(1)/D(2)
      A(1,3)=D(1)/D(2)
      A(2,3)=P(2)-P(1)*A(1,3)
      A(2,2)=2.*(P(1)+P(2))-P(1)*A(1,2)
      A(2,3)=A(2,3)/A(2,2)
      B(2)=B(2)/A(2,2)
      DO 4 K=3,MM
      A(K,2)=2.*(P(K-1)+P(K))-P(K-1)*A(K-1,3)
      B(K)=B(K)-P(K-1)*B(K-1)
      A(K,3)=P(K)/A(K,2)
    4 B(K)=B(K)/A(K,2)
      Q=D(M-2)/D(M-1)
      A(M,1)=1.+Q+A(M-2,3)
      A(M,2)=-Q-A(M,1)*A(M-1,3)
      B(M)=B(M-2)-A(M,1)*B(M-1)
      Z(M)=B(M)/A(M,2)
      MN=M-2
```

```
      DO 6 I=1,MN
      K=M-I
    6 Z(K)=B(K)-A(K,3)*Z(K+1)
      Z(1)=-A(1,2)*Z(2)-A(1,3)*Z(3)
      DO 7 K=1,MM
      Q=1./(6.*D(K))
      C(1,K)=Z(K)*Q
      C(2,K)=Z(K+1)*Q
      C(3,K)=Y(K)/D(K)-Z(K)*P(K)
    7 C(4,K)=Y(K+1)/D(K)-Z(K+1)*P(K)
      RETURN
      END
```

```
      FUNCTION F1(T,X1,X2,X3,X4,X5)
      IMPLICIT REAL*8(A-H,K-Z)
      COMMON CM,CL,CD,CZ,DE,BIY,CMTD,CMAD,CMDE,CBAR,V(14),Z1,Z2,XX(14),A
     1A,CLTD,CLDE,CT,G,RHO,S,X(14),Y(14),MA,CMA,TT,JM
      AA=(X1*X1+X2*X2)
      CALL SPLIN1(X,Y,JM,X5,CLA)
      CALL SPLIN1(X,XX,JM,X5,CMA)
      CALL SPLIN1(X,V,JM,X5,CD)
      CL=CLA+CLTD*0.5*CBAR*X4/DSQRT(AA)+CLDE*DE

LOGIC STATEMENTS ARE INSERTED HERE TO INCLUDE DELTA CL
      IF(X5.LE.0.4084) GO TO 5
      CL=CL-0.050

    5 CT=(2.0*TT)/(RHO*AA*S)
       CX=CT+CL*&SIN(X5)-C&*&&  8  8
      CZ=(-1.0*(CL*DCOS(X5)+CD*DSIN(X5)))
      F1=((RHO*AA*S)/(2.0*MA))*CX-G*DSIN(X3)-X2*X4
      Z1=F1
10    RETURN
      END
```

```
      SUBROUTINE TRIM(W,THETA,AOA,B1,C1,D1,E1,FF,VLL,I1)
      IMPLICIT REAL*8(A-H,K-Z)
      COMMON CM,CL,CD,CZ,DE,BIY,CMTD,CMAD,CMDE,CBAR,V(14),Z1,Z2,XX(14),A
     1A,CLTD,CLDE,CT,G,RHO,S,X(14),Y(14),MA,CMA,TT,JM
      X5=AOA
      CM=0.0
      CALL SPLIN1(X,V,JM,X5,CD)
      CALL SPLIN1(X,XX,JM,X5,CMA)
      CALL SPLIN1(X,Y,JM,X5,CLA)
      DE=-1.0*(CMA/CMDE)
      CL=CLA+CLDE*DE

LOGIC STATEMENTS ARE INSERTED HERE TO INCLUDE DELTA CL
      IF(X5.LE.0.4084) GO TO 5
      CL=CL-0.050

    5 AT=THETA-AOA
       IF(AT) 1,2,2
1     AT=AOA-THETA
2     IF(I1.EQ.2) GO TO 3
      SAT=DSIN(AT)
      CAT=DCOS(AT)
      SA=DSIN(AOA)
      CA=DCOS(AOA)
      NUM1=W*(CAT*CA-SAT*SA)
      DEN1=S*(CL*CA+CD*SA)
      Q=NUM1/DEN1
      LD=CL/CD
      NUM2=W*(LD*SAT+CAT)
      DEN2=LD*CA+SA
      TT=NUM2/DEN2
      GO TO 4
3     Q=(W*DCOS(AT))/(CL*S)
      TT=0.0
4     VX=(2.0*Q)/RHO
      VLL=DSQRT(VX)
      B1=VLL*DCOS(X5)
      C1=VLL*DSIN(X5)
      D1=THETA
      E1=0.0
      FF=X5
      RETURN
      END
```

INPUT DATA

TT = 0.0	CLTD = 0.000010	CLDE = 0.4300	RHO = 0.0023780
S = 239.00	MASS = 384.13	JM = 14	CMTD =-8.165030
CMAD =-4.268080	CMDE =-0.8800	BIY = 26545.00	CBAR = 6.40
I1 = 2	I2 = 1	I3 = 1	I4 = 1

DATA USED BY SPLIN IN TABLE LOOK UP

ANGLE OF ATTACK	CL	CD	CM
0.104720	0.552000	0.094000	-0.002500
0.139630	0.738000	0.115000	-0.017000
0.174530	0.921000	0.140000	-0.031500
0.209440	1.093000	0.169500	-0.044500
0.244350	1.233000	0.203000	-0.058500
0.279250	1.346000	0.249000	-0.074000
0.314160	1.430000	0.312000	-0.091000
0.349070	1.484000	0.364000	-0.112000
0.383970	1.513000	0.405000	-0.132000
0.408407	1.522000	0.455000	-0.152000
0.415389	1.450000	0.493000	-0.172000
0.418880	1.400000	0.535000	-0.207500
0.453790	0.950000	0.572000	-0.240000
0.488690	0.500000	0.610000	-0.279500

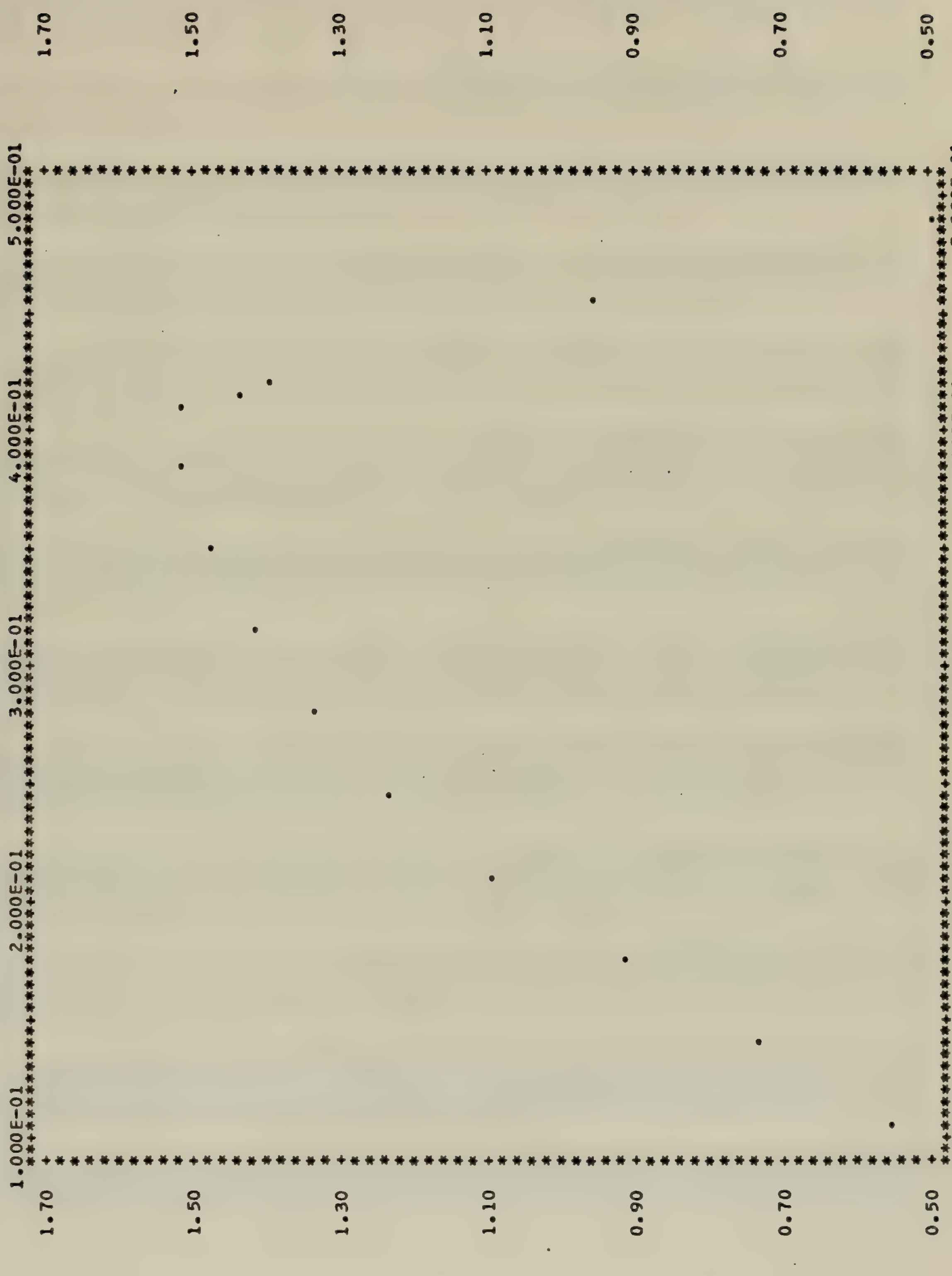
INPUT DATA

ANGLE OF ATTACK = 0.40830
PITCH ANGLE = 0.09890
AIRCRAFT WEIGHT = 12359.00

FOR TRIMMED LEVEL FLIGHT, THE AIRCRAFT PARAMETERS HAVE THE FOLLOWING VALUES.

X VEL	Z VEL	A/C VEL	THETA	THETA DOT	AOA	ELEV. ANGLE	CL	CM	CD
155.213	67.147	169.114	0.0989	0.0	0.40830	-0.1726785	1.4484907	0.0	0.4546911

THRUST FOR LEVEL FLIGHT = 0.0



CL VS AOA (TABLE LOOK-UP DATA)

TIME	X VEL	Z VEL	A/C VEL	THETA	THETA DOT	AOA	DE	CL	CL-*	CM	CD	ANFP	ALT
0.0	155.213	67.147	169.114	0.09890	0.0	0.40830	-0.17268	1.4485	1.5207	0.0	0.4547	0.9525	0.0
0.050	155.221	67.150	169.123	0.09890	0.00000	0.40830	-0.17268	1.4485	1.5207	0.0000	0.4547	0.9525	-4.3
0.100	155.229	67.153	169.132	0.09890	0.00000	0.40830	-0.17268	1.4485	1.5207	0.0000	0.4547	0.9525	-8.7
0.150	155.237	67.156	169.140	0.09890	0.00000	0.40830	-0.17268	1.4485	1.5207	0.0000	0.4547	0.9525	-13.0
0.200	155.245	67.159	169.149	0.09890	0.00000	0.40829	-0.17268	1.4485	1.5207	0.0000	0.4547	0.9525	-17.4
0.250	155.253	67.162	169.158	0.09890	0.00000	0.40829	-0.17268	1.4486	1.5208	0.0000	0.4547	0.9525	-21.7
0.300	155.262	67.165	169.166	0.09890	0.00000	0.40828	-0.17268	1.4486	1.5208	0.0000	0.4546	0.9525	-26.1
0.350	155.270	67.167	169.175	0.09890	0.00001	0.40828	-0.17268	1.4487	1.5208	0.0000	0.4546	0.9526	-30.4
0.400	155.278	67.169	169.183	0.09890	0.00001	0.40827	-0.17268	1.4487	1.5208	0.0000	0.4546	0.9526	-34.8
0.450	155.287	67.171	169.192	0.09890	0.00001	0.40826	-0.17268	1.4488	1.5209	0.0000	0.4546	0.9526	-39.1
0.500	155.295	67.173	169.200	0.09890	0.00001	0.40825	-0.17268	1.4488	1.5209	0.0000	0.4545	0.9526	-43.5
0.550	155.303	67.175	169.209	0.09890	0.00002	0.40824	-0.17268	1.4489	1.5210	0.0000	0.4545	0.9526	-47.8
0.600	155.312	67.176	169.217	0.09890	0.00002	0.40823	-0.17268	1.4490	1.5210	0.0000	0.4545	0.9527	-52.2
0.650	155.320	67.177	169.225	0.09891	0.00003	0.40821	-0.17268	1.4491	1.5211	0.0001	0.4544	0.9527	-56.5
0.700	155.329	67.178	169.234	0.09891	0.00003	0.40820	-0.17268	1.4492	1.5211	0.0001	0.4544	0.9527	-60.9
0.750	155.338	67.179	169.242	0.09891	0.00004	0.40818	-0.17268	1.4493	1.5212	0.0001	0.4544	0.9528	-65.2
0.800	155.346	67.180	169.250	0.09891	0.00005	0.40816	-0.17268	1.4494	1.5212	0.0001	0.4543	0.9528	-69.6
0.850	155.355	67.180	169.258	0.09891	0.00005	0.40815	-0.17268	1.4495	1.5213	0.0001	0.4542	0.9529	-73.9
0.900	155.364	67.180	169.267	0.09892	0.00006	0.40813	-0.17268	1.4497	1.5213	0.0001	0.4542	0.9529	-78.3
0.950	155.373	67.180	169.275	0.09892	0.00007	0.40811	-0.17268	1.4498	1.5214	0.0001	0.4541	0.9530	-82.6
1.000	155.382	67.180	169.283	0.09892	0.00008	0.40808	-0.17268	1.4500	1.5214	0.0001	0.4541	0.9530	-87.0
1.050	155.391	67.180	169.291	0.09893	0.00009	0.40806	-0.17268	1.4501	1.5215	0.0001	0.4540	0.9531	-91.3
1.100	155.400	67.179	169.299	0.09893	0.00011	0.40804	-0.17268	1.4503	1.5215	0.0001	0.4539	0.9532	-95.7
1.150	155.409	67.179	169.307	0.09894	0.00012	0.40801	-0.17268	1.4504	1.5216	0.0001	0.4539	0.9533	-100.0
1.200	155.418	67.178	169.315	0.09894	0.00014	0.40799	-0.17268	1.4506	1.5216	0.0002	0.4538	0.9533	-104.4
1.250	155.428	67.177	169.324	0.09895	0.00015	0.40796	-0.17268	1.4508	1.5216	0.0002	0.4537	0.9534	-108.7
1.300	155.437	67.175	169.332	0.09896	0.00017	0.40793	-0.17268	1.4510	1.5217	0.0002	0.4536	0.9535	-113.1
1.350	155.446	67.174	169.340	0.09897	0.00019	0.40790	-0.17268	1.4512	1.5217	0.0002	0.4535	0.9536	-117.4
1.400	155.456	67.172	169.348	0.09898	0.00020	0.40787	-0.17268	1.4514	1.5218	0.0002	0.4535	0.9537	-121.8
1.450	155.465	67.171	169.356	0.09899	0.00022	0.40784	-0.17268	1.4516	1.5218	0.0002	0.4534	0.9539	-126.1
1.500	155.475	67.169	169.364	0.09900	0.00025	0.40780	-0.17268	1.4518	1.5218	0.0002	0.4533	0.9540	-130.5
1.550	155.484	67.167	169.372	0.09901	0.00027	0.40777	-0.17268	1.4520	1.5218	0.0002	0.4532	0.9541	-134.8
1.600	155.494	67.164	169.380	0.09903	0.00029	0.40774	-0.17268	1.4522	1.5218	0.0003	0.4531	0.9543	-139.2
1.650	155.504	67.162	169.388	0.09904	0.00032	0.40770	-0.17268	1.4524	1.5218	0.0003	0.4530	0.9544	-143.5
1.700	155.513	67.160	169.396	0.09906	0.00034	0.40766	-0.17268	1.4527	1.5218	0.0003	0.4529	0.9546	-147.9
1.750	155.523	67.157	169.403	0.09908	0.00037	0.40763	-0.17268	1.4529	1.5218	0.0003	0.4528	0.9547	-152.2
1.800	155.533	67.154	169.411	0.09910	0.00040	0.40759	-0.17268	1.4531	1.5218	0.0003	0.4527	0.9549	-156.5
1.850	155.543	67.151	169.419	0.09912	0.00043	0.40755	-0.17268	1.4534	1.5217	0.0003	0.4526	0.9551	-160.9
1.900	155.553	67.148	169.427	0.09914	0.00046	0.40751	-0.17268	1.4536	1.5217	0.0003	0.4524	0.9553	-165.2
1.950	155.563	67.145	169.435	0.09916	0.00050	0.40747	-0.17268	1.4539	1.5216	0.0003	0.4523	0.9555	-169.6
2.000	155.572	67.142	169.443	0.09919	0.00053	0.40743	-0.17268	1.4541	1.5216	0.0004	0.4522	0.9557	-173.9
2.050	155.582	67.139	169.451	0.09922	0.00057	0.40739	-0.17268	1.4543	1.5215	0.0004	0.4521	0.9559	-178.3
2.100	155.592	67.136	169.458	0.09925	0.00061	0.40735	-0.17268	1.4546	1.5214	0.0004	0.4520	0.9561	-182.6
2.150	155.602	67.132	169.466	0.09928	0.00064	0.40731	-0.17268	1.4548	1.5213	0.0004	0.4519	0.9563	-186.9
2.200	155.612	67.129	169.474	0.09931	0.00068	0.40727	-0.17268	1.4551	1.5212	0.0004	0.4518	0.9566	-191.3
2.250	155.622	67.125	169.481	0.09935	0.00073	0.40723	-0.17268	1.4553	1.5210	0.0004	0.4516	0.9568	-195.6
2.300	155.631	67.122	169.489	0.09938	0.00077	0.40718	-0.17268	1.4556	1.5209	0.0004	0.4515	0.9570	-200.0
2.350	155.641	67.119	169.497	0.09942	0.00081	0.40714	-0.17268	1.4558	1.5207	0.0005	0.4514	0.9573	-204.3
2.400	155.651	67.115	169.504	0.09946	0.00086	0.40710	-0.17268	1.4560	1.5206	0.0005	0.4513	0.9576	-208.6
2.450	155.661	67.112	169.512	0.09951	0.00090	0.40706	-0.17268	1.4563	1.5204	0.0005	0.4512	0.9578	-213.0
2.500	155.670	67.108	169.519	0.09956	0.00095	0.40702	-0.17268	1.4565	1.5202	0.0005	0.4511	0.9581	-217.3
2.550	155.680	67.105	169.526	0.09960	0.00100	0.40698	-0.17268	1.4567	1.5200	0.0005	0.4510	0.9584	-221.6
2.600	155.689	67.102	169.534	0.09966	0.00105	0.40694	-0.17268	1.4569	1.5197	0.0005	0.4509	0.9587	-226.0
2.650	155.698	67.098	169.541	0.09971	0.00110	0.40690	-0.17268	1.4572	1.5195	0.0005	0.4507	0.9590	-230.3
2.700	155.707	67.095	169.548	0.09977	0.00115	0.40686	-0.17268	1.4574	1.5192	0.0005	0.4506	0.9593	-234.6
2.750	155.716	67.092	169.555	0.09982	0.00120	0.40683	-0.17268	1.4576	1.5190	0.0005	0.4505	0.9596	-238.9
2.800	155.725	67.089	169.562	0.09989	0.00126	0.40679	-0.17268	1.4578	1.5187	0.0005	0.4504	0.9599	-243.3
2.850	155.734	67.087	169.569	0.09995	0.00131	0.40675	-0.17268	1.4580	1.5184	0.0006	0.4503	0.9602	-247.6
2.900	155.743	67.084	169.576	0.10002	0.00137	0.40672	-0.17268	1.4582	1.5181	0.0006	0.4502	0.9605	-251.9
2.950	155.751	67.081	169.583	0.10009	0.00142	0.40669	-0.17268	1.4583	1.5177	0.0006	0.4502	0.9609	-256.2
3.000	155.759	67.079	169.589	0.10016	0.00148	0.40665	-0.17268	1.4585	1.5174	0.0006	0.4501	0.9612	-260.6
3.050	155.764	67.084	169.596	0.10025	0.00228	0.40667	-0.18140	1.4547	1.5068	0.0080	0.4501	0.9654	-264.9
3.100	155.770	67.088	169.602	0.10037	0.00232	0.40668	-0.17268	1.4584	1.5102	0.0004	0.4501	0.9657	-269.2
3.150	155.774	67.092	169.608	0.10049	0.00235	0.40669	-0.17268	1.4583	1.5098	0.0004	0.4502	0.9659	-273.5
3.200	155.779	67.096	169.614	0.10060	0.00239	0.40670	-0.17268	1.4583	1.5094	0.0003	0.4502	0.9661	-277.8
3.250	155.783	67.101	169.620	0.10072	0.00242	0.40672	-0.17268	1.4582	1.5090	0.0003	0.4502	0.9663	-282.2
3.300	155.787	67.105	169.625	0.10085	0.00245	0.40673	-0.17268	1.4581	1.5086	0.0003	0.4503	0.9665	-286.5
3.350	155.790	67.110	169.630	0.10097	0.00248	0.40675	-0.17268	1.4580	1.5082	0.0003	0.4503	0.9667	-290.8
3.400	155.793	67.115	169.635	0.10109	0.00251	0.40677	-0.17268	1.4579	1.5078	0.0003	0.4504	0.9669	-295.1
3.450	155.796	67.121	169.639	0.10122	0.00253	0.40679	-0.17268	1.4578	1.5074	0.0003	0.4504	0.9670	-299.4
3.500	155.798	67.126	169.644	0.10135	0.00256	0.40682	-0.17268	1.4576	1.5071	0.0002	0.4505	0.9672	-303.7
3.550	155.800	67.132	169.648	0.10148	0.00258	0.40684	-0.17268	1.4575	1.5067	0.0002	0.4506	0.9673	-308.0
3.600	155.802	67.138	169.652	0.10160	0.00260	0.40687	-0.17268	1.4573	1.5063	0.0002	0.4507	0.9675	-312.3
3.650	155.803	67.144	169.655	0.10174	0.00262	0.40690	-0.17268	1.4572	1.5059	0.0002	0.4507	0.9676	-316.6

TIME	X VEL	Z VEL	A/C VEL	THETA	THETA DOT	AOA	DE	CL	CL-*	CM	CD	ANFP	ALT
3.700	155.804	67.150	169.659	0.10187	0.00263	0.40693	-0.17268	1.4570	1.5056	0.0002	0.4508	0.9677	-321.0
3.750	155.805	67.157	169.662	0.10200	0.00265	0.40697	-0.17268	1.4568	1.5052	0.0001	0.4509	0.9678	-325.3
3.800	155.805	67.163	169.665	0.10213	0.00266	0.40700	-0.17268	1.4566	1.5049	0.0001	0.4510	0.9679	-329.6
3.850	155.805	67.170	169.667	0.10226	0.00267	0.40704	-0.17268	1.4564	1.5045	0.0001	0.4511	0.9680	-333.9
3.900	155.804	67.177	169.669	0.10240	0.00268	0.40708	-0.17268	1.4562	1.5042	0.0001	0.4512	0.9681	-338.2
3.950	155.803	67.184	169.671	0.10253	0.00268	0.40712	-0.17268	1.4559	1.5039	0.0000	0.4513	0.9681	-342.5
4.000	155.802	67.191	169.673	0.10267	0.00269	0.40716	-0.17268	1.4557	1.5035	0.0000	0.4515	0.9682	-346.8
4.050	155.800	67.199	169.674	0.10280	0.00269	0.40721	-0.17268	1.4554	1.5032	-0.0000	0.4516	0.9682	-351.0
4.100	155.798	67.206	169.675	0.10294	0.00269	0.40725	-0.17268	1.4552	1.5029	-0.0000	0.4517	0.9682	-355.3
4.150	155.796	67.214	169.676	0.10307	0.00268	0.40730	-0.17268	1.4549	1.5026	-0.0001	0.4519	0.9682	-359.6
4.200	155.793	67.222	169.677	0.10320	0.00268	0.40735	-0.17268	1.4546	1.5023	-0.0001	0.4520	0.9682	-363.9
4.250	155.790	67.230	169.677	0.10334	0.00267	0.40740	-0.17268	1.4543	1.5021	-0.0001	0.4521	0.9682	-368.2
4.300	155.786	67.238	169.677	0.10347	0.00265	0.40745	-0.17268	1.4540	1.5018	-0.0001	0.4523	0.9682	-372.5
4.350	155.782	67.247	169.677	0.10360	0.00264	0.40751	-0.17268	1.4536	1.5015	-0.0002	0.4524	0.9681	-376.8
4.400	155.778	67.255	169.676	0.10373	0.00262	0.40756	-0.17268	1.4533	1.5013	-0.0002	0.4526	0.9680	-381.1
4.450	155.773	67.264	169.676	0.10386	0.00260	0.40762	-0.17268	1.4529	1.5010	-0.0002	0.4528	0.9680	-385.4
4.500	155.768	67.273	169.674	0.10399	0.00258	0.40768	-0.17268	1.4526	1.5008	-0.0002	0.4529	0.9679	-389.7
4.550	155.763	67.282	169.673	0.10412	0.00256	0.40774	-0.17268	1.4522	1.5006	-0.0003	0.4531	0.9678	-393.9
4.600	155.757	67.291	169.671	0.10425	0.00253	0.40780	-0.17268	1.4518	1.5003	-0.0003	0.4533	0.9676	-398.2
4.650	155.751	67.300	169.669	0.10438	0.00250	0.40787	-0.17268	1.4514	1.5001	-0.0003	0.4535	0.9675	-402.5
4.700	155.745	67.309	169.667	0.10450	0.00247	0.40793	-0.17268	1.4509	1.4999	-0.0003	0.4536	0.9674	-406.8
4.750	155.738	67.319	169.665	0.10462	0.00244	0.40800	-0.17268	1.4505	1.4997	-0.0004	0.4538	0.9672	-411.1
4.800	155.731	67.328	169.662	0.10474	0.00240	0.40807	-0.17268	1.4501	1.4995	-0.0004	0.4540	0.9670	-415.4
4.850	155.723	67.338	169.659	0.10486	0.00236	0.40814	-0.17268	1.4496	1.4993	-0.0004	0.4542	0.9668	-419.6
4.900	155.716	67.348	169.656	0.10498	0.00232	0.40821	-0.17268	1.4491	1.4992	-0.0004	0.4544	0.9666	-423.9
4.950	155.707	67.357	169.652	0.10510	0.00228	0.40828	-0.17268	1.4486	1.4990	-0.0005	0.4546	0.9664	-428.2
5.000	155.699	67.367	169.648	0.10521	0.00223	0.40836	-0.17268	1.4481	1.4988	-0.0005	0.4549	0.9662	-432.5
5.050	155.690	67.378	169.644	0.10532	0.00218	0.40843	-0.17268	1.4476	1.4987	-0.0005	0.4551	0.9659	-436.7
5.100	155.681	67.388	169.640	0.10543	0.00213	0.40851	-0.17268	1.4470	1.4985	-0.0005	0.4553	0.9656	-441.0
5.150	155.671	67.398	169.635	0.10553	0.00207	0.40859	-0.17268	1.4465	1.4984	-0.0006	0.4555	0.9654	-445.3
5.200	155.661	67.408	169.630	0.10563	0.00202	0.40867	-0.17268	1.4459	1.4982	-0.0006	0.4558	0.9651	-449.6
5.250	155.651	67.419	169.625	0.10573	0.00196	0.40875	-0.17268	1.4453	1.4981	-0.0006	0.4560	0.9648	-453.8
5.300	155.641	67.430	169.620	0.10583	0.00190	0.40883	-0.17268	1.4447	1.4980	-0.0006	0.4562	0.9645	-458.1
5.350	155.630	67.440	169.614	0.10592	0.00183	0.40891	-0.17268	1.4441	1.4978	-0.0007	0.4565	0.9641	-462.4
5.400	155.619	67.451	169.608	0.10601	0.00177	0.40900	-0.17268	1.4435	1.4977	-0.0007	0.4567	0.9638	-466.7
5.450	155.608	67.462	169.602	0.10610	0.00170	0.40908	-0.17268	1.4428	1.4976	-0.0007	0.4570	0.9634	-470.9
5.500	155.596	67.473	169.596	0.10618	0.00163	0.40917	-0.17268	1.4421	1.4975	-0.0007	0.4573	0.9630	-475.2
5.550	155.584	67.485	169.589	0.10626	0.00155	0.40926	-0.17268	1.4414	1.4974	-0.0008	0.4575	0.9626	-479.5
5.600	155.571	67.496	169.582	0.10634	0.00147	0.40935	-0.17268	1.4407	1.4973	-0.0008	0.4578	0.9622	-483.8
5.650	155.559	67.507	169.575	0.10641	0.00139	0.40944	-0.17268	1.4400	1.4972	-0.0008	0.4581	0.9618	-488.0
5.700	155.546	67.519	169.568	0.10648	0.00131	0.40953	-0.17268	1.4392	1.4972	-0.0009	0.4584	0.9613	-492.3
5.750	155.533	67.530	169.560	0.10654	0.00122	0.40963	-0.17268	1.4385	1.4971	-0.0009	0.4587	0.9608	-496.6
5.800	155.519	67.542	169.553	0.10660	0.00113	0.40972	-0.17268	1.4377	1.4971	-0.0010	0.4590	0.9603	-500.9
5.850	155.505	67.553	169.545	0.10665	0.00103	0.40982	-0.17268	1.4369	1.4971	-0.0010	0.4593	0.9598	-505.1
5.900	155.491	67.565	169.536	0.10670	0.00093	0.40991	-0.17268	1.4361	1.4971	-0.0011	0.4596	0.9593	-509.4
5.950	155.477	67.577	169.528	0.10675	0.00082	0.41001	-0.17268	1.4353	1.4971	-0.0011	0.4599	0.9587	-513.7
6.000	155.463	67.589	169.519	0.10678	0.00071	0.41011	-0.17268	1.4344	1.4972	-0.0012	0.4603	0.9581	-518.0
6.050	155.448	67.600	169.511	0.10682	0.00059	0.41020	-0.17268	1.4336	1.4973	-0.0012	0.4606	0.9575	-522.2
6.100	155.433	67.612	169.502	0.10684	0.00047	0.41030	-0.17268	1.4327	1.4974	-0.0013	0.4610	0.9568	-526.5
6.150	155.418	67.624	169.492	0.10686	0.00034	0.41040	-0.17268	1.4318	1.4976	-0.0014	0.4613	0.9561	-530.8
6.200	155.403	67.635	169.483	0.10688	0.00020	0.41050	-0.17268	1.4310	1.4979	-0.0014	0.4617	0.9553	-535.1
6.250	155.387	67.646	169.473	0.10688	0.00006	0.41060	-0.17268	1.4301	1.4982	-0.0015	0.4620	0.9545	-539.3
6.300	155.372	67.657	169.463	0.10688	-0.00009	0.41069	-0.17268	1.4292	1.4986	-0.0016	0.4624	0.9537	-543.6
6.350	155.356	67.668	169.453	0.10687	-0.00025	0.41078	-0.17268	1.4283	1.4990	-0.0017	0.4627	0.9529	-547.9
6.400	155.341	67.678	169.443	0.10686	-0.00042	0.41088	-0.17268	1.4275	1.4995	-0.0017	0.4631	0.9519	-552.2
6.450	155.325	67.688	169.433	0.10683	-0.00059	0.41097	-0.17268	1.4266	1.5001	-0.0018	0.4635	0.9510	-556.5
6.500	155.310	67.697	169.422	0.10680	-0.00078	0.41105	-0.17268	1.4258	1.5009	-0.0019	0.4638	0.9500	-560.8
6.550	155.294	67.706	169.412	0.10675	-0.00097	0.41114	-0.17268	1.4250	1.5017	-0.0020	0.4642	0.9489	-565.0
6.600	155.279	67.714	169.401	0.10670	-0.00117	0.41122	-0.17268	1.4242	1.5026	-0.0021	0.4645	0.9478	-569.3
6.650	155.264	67.721	169.391	0.10664	-0.00137	0.41129	-0.17268	1.4235	1.5036	-0.0021	0.4648	0.9467	-573.6
6.700	155.250	67.728	169.380	0.10656	-0.00159	0.41136	-0.17268	1.4228	1.5048	-0.0022	0.4651	0.9455	-577.9
6.750	155.236	67.733	169.369	0.10648	-0.00181	0.41142	-0.17268	1.4222	1.5060	-0.0023	0.4654	0.9443	-582.2
6.800	155.222	67.737	169.358	0.10638	-0.00204	0.41148	-0.17268	1.4216	1.5074	-0.0023	0.4656	0.9431	-586.5
6.850	155.209	67.741	169.347	0.10628	-0.00227	0.41153	-0.17268	1.4211	1.5089	-0.0024	0.4659	0.9418	-590.8
6.900	155.196	67.743	169.337	0.10616	-0.00250	0.41157	-0.17268	1.4207	1.5105	-0.0024	0.4660	0.9406	-595.1
6.950	155.184	67.744	169.326	0.10602	-0.00274	0.41160	-0.17268	1.4204	1.5122	-0.0024	0.4662	0.9393	-599.4
7.000	155.173	67.743	169.316	0.10588	-0.00297	0.41162	-0.17268	1.4202	1.5141	-0.0024	0.4663	0.9380	-603.7
7.050	155.163	67.741	169.306	0.10573	-0.00321	0.41164	-0.17268	1.4201	1.5160	-0.0024	0.4663	0.9367	-608.0
7.100	155.154	67.737	169.296	0.10556	-0.00344	0.41164	-0.17268	1.4200	1.5180	-0.0023	0.4664	0.9354	-612.3
7.150	155.146	67.732	169.286	0.10538	-0.00366	0.41163	-0.17268	1.4201	1.5201	-0.0022	0.4663	0.9342	-616.6
7.200	155.139	67.725	169.277	0.10520	-0.00388	0.41161	-0.17268	1.4203	1.5223	-0.0022	0.4662	0.9330	-620.9
7.250	155.133	67.717	169.269	0.10500	-0.00408	0.41158	-0.17268	1.4207	1.5245	-0.0020	0.4661	0.9319	-625.2
7.300	155.129	67.707	169.261	0.10479	-0.00428	0.41153	-0.17268	1.4211	1.5267	-0.0019	0.4659	0.9308	-629.5
7.350	155.126	67.695	169.253	0.10457	-0.00446	0.41148	-0.17268	1.4217	1.5289	-0.0018	0.4656	0.9298	-633.9
7.400	155.124	67.681	169.246	0.10434	-0.00462	0.41141	-0.17268	1.4223	1.5312	-0.0016	0.4653	0.9289	-638.2

TIME	X VEL	Z VEL	A/C VEL	THETA	THETA DOT	AOA	DE	CL	CL-*	CM	CD	ANFP	ALT
7.450	155.123	67.666	169.239	0.10411	-0.00477	0.41133	-0.17268	1.4231	1.5334	-0.0014	0.4650	0.9281	-642.5
7.500	155.124	67.649	169.234	0.10387	-0.00490	0.41123	-0.17268	1.4241	1.5356	-0.0012	0.4646	0.9274	-646.8
7.550	155.127	67.631	169.229	0.10362	-0.00501	0.41113	-0.17268	1.4251	1.5377	-0.0010	0.4641	0.9267	-651.1
7.600	155.131	67.611	169.224	0.10337	-0.00510	0.41101	-0.17268	1.4262	1.5398	-0.0008	0.4636	0.9262	-655.5
7.650	155.136	67.590	169.221	0.10311	-0.00518	0.41088	-0.17268	1.4274	1.5418	-0.0007	0.4631	0.9258	-659.8
7.700	155.143	67.567	169.218	0.10285	-0.00523	0.41074	-0.17268	1.4287	1.5438	-0.0005	0.4626	0.9255	-664.1
7.750	155.151	67.543	169.216	0.10259	-0.00527	0.41060	-0.17268	1.4301	1.5456	-0.0003	0.4620	0.9252	-668.5
7.800	155.161	67.518	169.214	0.10232	-0.00529	0.41044	-0.17268	1.4315	1.5474	-0.0001	0.4614	0.9251	-672.8
7.850	155.172	67.491	169.214	0.10206	-0.00529	0.41026	-0.17268	1.4330	1.5491	0.0001	0.4608	0.9251	-677.1
7.900	155.184	67.464	169.214	0.10179	-0.00527	0.41009	-0.17268	1.4346	1.5507	0.0002	0.4602	0.9251	-681.5
7.950	155.198	67.435	169.215	0.10153	-0.00524	0.40990	-0.17268	1.4362	1.5522	0.0004	0.4596	0.9253	-685.8
8.000	155.213	67.405	169.217	0.10127	-0.00520	0.40970	-0.17268	1.4379	1.5537	0.0005	0.4589	0.9255	-690.1
8.050	155.229	67.374	169.220	0.10101	-0.00514	0.40949	-0.17268	1.4396	1.5550	0.0006	0.4583	0.9258	-694.5
8.100	155.247	67.342	169.223	0.10076	-0.00507	0.40928	-0.17268	1.4413	1.5563	0.0007	0.4576	0.9261	-698.8
8.150	155.266	67.310	169.228	0.10050	-0.00500	0.40906	-0.17268	1.4430	1.5575	0.0008	0.4569	0.9265	-703.1
8.200	155.286	67.276	169.233	0.10026	-0.00491	0.40883	-0.17268	1.4447	1.5586	0.0009	0.4562	0.9269	-707.5
8.250	155.306	67.242	169.238	0.10001	-0.00482	0.40859	-0.17268	1.4464	1.5596	0.0010	0.4555	0.9274	-711.8
8.300	155.329	67.207	169.244	0.09977	-0.00471	0.40835	-0.17268	1.4481	1.5605	0.0011	0.4548	0.9280	-716.2
8.350	155.352	67.171	169.251	0.09954	-0.00460	0.40810	-0.17268	1.4498	1.5613	0.0012	0.4541	0.9286	-720.5
8.400	155.376	67.135	169.259	0.09931	-0.00448	0.40785	-0.17268	1.4515	1.5620	0.0013	0.4534	0.9292	-724.8
8.450	155.401	67.098	169.268	0.09909	-0.00435	0.40759	-0.17268	1.4531	1.5626	0.0014	0.4527	0.9299	-729.2
8.500	155.427	67.061	169.277	0.09888	-0.00420	0.40733	-0.17268	1.4547	1.5630	0.0015	0.4519	0.9307	-733.5
8.550	155.453	67.023	169.286	0.09867	-0.00405	0.40707	-0.17268	1.4562	1.5633	0.0016	0.4512	0.9315	-737.9
8.600	155.481	66.986	169.297	0.09847	-0.00389	0.40680	-0.17268	1.4577	1.5635	0.0017	0.4505	0.9324	-742.2
8.650	155.509	66.948	169.307	0.09828	-0.00372	0.40653	-0.17268	1.4592	1.5634	0.0018	0.4497	0.9333	-746.5
8.700	155.537	66.911	169.319	0.09810	-0.00353	0.40626	-0.17268	1.4605	1.5632	0.0019	0.4490	0.9343	-750.9
8.750	155.567	66.873	169.331	0.09793	-0.00334	0.40599	-0.17268	1.4618	1.5628	0.0021	0.4483	0.9354	-755.2
8.800	155.596	66.837	169.344	0.09777	-0.00313	0.40572	-0.17268	1.4631	1.5623	0.0022	0.4475	0.9365	-759.6
8.850	155.626	66.800	169.357	0.09762	-0.00291	0.40545	-0.17268	1.4642	1.5615	0.0023	0.4468	0.9377	-763.9
8.900	155.656	66.765	169.370	0.09748	-0.00268	0.40519	-0.17268	1.4653	1.5606	0.0024	0.4461	0.9389	-768.2
8.950	155.686	66.730	169.385	0.09735	-0.00244	0.40493	-0.17268	1.4663	1.5595	0.0025	0.4455	0.9402	-772.6
9.000	155.717	66.696	169.399	0.09724	-0.00219	0.40467	-0.17268	1.4673	1.5583	0.0026	0.4448	0.9416	-776.9
9.050	155.747	66.663	169.414	0.09713	-0.00193	0.40443	-0.17268	1.4681	1.5568	0.0027	0.4442	0.9430	-781.2
9.100	155.777	66.631	169.429	0.09704	-0.00165	0.40418	-0.17268	1.4689	1.5552	0.0028	0.4435	0.9445	-785.5
9.150	155.807	66.601	169.445	0.09697	-0.00137	0.40395	-0.17268	1.4696	1.5535	0.0029	0.4430	0.9460	-789.9
9.200	155.837	66.572	169.461	0.09691	-0.00108	0.40373	-0.17268	1.4703	1.5516	0.0030	0.4424	0.9476	-794.2
9.250	155.866	66.545	169.477	0.09686	-0.00078	0.40351	-0.17268	1.4709	1.5496	0.0031	0.4419	0.9492	-798.5
9.300	155.894	66.519	169.493	0.09683	-0.00047	0.40330	-0.17268	1.4714	1.5474	0.0032	0.4413	0.9509	-802.8
9.350	155.922	66.495	169.509	0.09681	-0.00016	0.40311	-0.17268	1.4719	1.5451	0.0032	0.4409	0.9526	-807.2
9.400	155.950	66.474	169.526	0.09681	0.00016	0.40293	-0.17268	1.4723	1.5427	0.0033	0.4404	0.9544	-811.5
9.450	155.976	66.454	169.543	0.09683	0.00049	0.40276	-0.17268	1.4727	1.5402	0.0033	0.4400	0.9561	-815.8
9.500	156.002	66.436	169.559	0.09686	0.00082	0.40260	-0.17268	1.4730	1.5377	0.0034	0.4396	0.9579	-820.1
9.550	156.027	66.420	169.576	0.09691	0.00115	0.40246	-0.17268	1.4733	1.5351	0.0034	0.4393	0.9597	-824.4
9.600	156.051	66.406	169.593	0.09698	0.00148	0.40233	-0.17268	1.4735	1.5324	0.0034	0.4390	0.9616	-828.7
9.650	156.074	66.395	169.609	0.09706	0.00182	0.40222	-0.17268	1.4737	1.5297	0.0034	0.4387	0.9634	-833.0
9.700	156.096	66.386	169.626	0.09716	0.00216	0.40211	-0.17268	1.4739	1.5269	0.0034	0.4385	0.9652	-837.3
9.750	156.116	66.379	169.642	0.09727	0.00250	0.40203	-0.17268	1.4740	1.5242	0.0034	0.4383	0.9671	-841.6
9.800	156.136	66.374	169.658	0.09741	0.00283	0.40196	-0.17268	1.4741	1.5214	0.0034	0.4381	0.9689	-845.9
9.850	156.154	66.371	169.674	0.09756	0.00317	0.40190	-0.17268	1.4742	1.5186	0.0034	0.4380	0.9707	-850.2
9.900	156.171	66.371	169.689	0.09772	0.00349	0.40186	-0.17268	1.4743	1.5159	0.0033	0.4379	0.9725	-854.5
9.950	156.187	66.373	169.705	0.09791	0.00382	0.40183	-0.17268	1.4743	1.5132	0.0033	0.4378	0.9743	-858.8
10.000	156.201	66.377	169.720	0.09811	0.00414	0.40182	-0.17268	1.4743	1.5105	0.0032	0.4378	0.9761	-863.1
10.050	156.214	66.383	169.734	0.09832	0.00445	0.40183	-0.17268	1.4743	1.5078	0.0031	0.4378	0.9778	-867.4
10.100	156.226	66.391	169.748	0.09855	0.00475	0.40185	-0.17268	1.4743	1.5052	0.0030	0.4378	0.9794	-871.7
10.150	156.236	66.402	169.762	0.09880	0.00505	0.40188	-0.17268	1.4742	1.5027	0.0029	0.4379	0.9811	-875.9
10.200	156.245	66.414	169.775	0.09905	0.00533	0.40192	-0.17268	1.4742	1.5002	0.0028	0.4380	0.9826	-880.2
10.250	156.253	66.428	169.787	0.09933	0.00561	0.40198	-0.17268	1.4741	1.4978	0.0027	0.4381	0.9841	-884.5
10.300	156.259	66.445	169.799	0.09962	0.00587	0.40206	-0.17268	1.4740	1.4955	0.0026	0.4383	0.9856	-888.8
10.350	156.264	66.463	169.811	0.09992	0.00613	0.40214	-0.17268	1.4738	1.4932	0.0025	0.4385	0.9870	-893.0
10.400	156.267	66.482	169.821	0.10023	0.00637	0.40224	-0.17268	1.4736	1.4910	0.0024	0.4388	0.9883	-897.3
10.450	156.269	66.504	169.832	0.10055	0.00659	0.40236	-0.17268	1.4735	1.4889	0.0022	0.4390	0.9896	-901.6
10.500	156.269	66.527	169.841	0.10089	0.00681	0.40248	-0.17268	1.4732	1.4869	0.0021	0.4393	0.9908	-905.8
10.550	156.269	66.551	169.850	0.10123	0.00700	0.40261	-0.17268	1.4730	1.4850	0.0019	0.4397	0.9919	-910.1
10.600	156.266	66.577	169.858	0.10159	0.00719	0.40276	-0.17268	1.4727	1.4831	0.0018	0.4400	0.9929	-914.4
10.650	156.262	66.605	169.865	0.10195	0.00736	0.40292	-0.17268	1.4723	1.4814	0.0016	0.4404	0.9939	-918.6
10.700	156.257	66.633	169.872	0.10232	0.00751	0.40308	-0.17268	1.4719	1.4797	0.0015	0.4408	0.9948	-922.9
10.750	156.251	66.663	169.877	0.10270	0.00765	0.40326	-0.17268	1.4715	1.4781	0.0013	0.4412	0.9956	-927.1
10.800	156.243	66.694	169.882	0.10309	0.00777	0.40345	-0.17268	1.4710	1.4765	0.0012	0.4417	0.9963	-931.4
10.850	156.233	66.726	169.886	0.10348	0.00788	0.40364	-0.17268	1.4705	1.4751	0.0010	0.4422	0.9969	-935.6
10.900	156.223	66.759	169.889	0.10388	0.00797	0.40385	-0.17268	1.4699	1.4737	0.0008	0.4427	0.9974	-939.8
10.950	156.211	66.793	169.892	0.10428	0.00805	0.40406	-0.17268	1.4693	1.4724	0.0007	0.4432	0.9979	-944.1
11.000	156.197	66.828	169.893	0.10468	0.00811	0.40428	-0.17268	1.4686	1.4712	0.0005	0.4438	0.9983	-948.3
11.050	156.183	66.864	169.894	0.10509	0.00815	0.40450	-0.17268	1.4679	1.4700	0.0004	0.4444	0.9985	-952.6
11.100	156.167	66.900	169.893	0.10549	0.00818	0.40474	-0.17268	1.4670	1.4689	0.0002	0.4450	0.9987	-956.8
11.150	156.149	66.937	169.892	0.10590	0.00819	0.40498	-0.17268	1.4661	1.4678	0.0000	0.4456	0.9988	-961.0

TIME	X VEL	Z VEL	A/C VEL	THETA	THETA DOT	AOA	DE	CL	CL-*	CM	CD	ANFP	ALT
11.200	156.131	66.975	169.890	0.10631	0.00818	0.40523	-0.17268	1.4652	1.4668	-0.0001	0.4462	0.9989	-965.2
11.250	156.111	67.014	169.887	0.10672	0.00816	0.40548	-0.17268	1.4641	1.4659	-0.0003	0.4469	0.9988	-969.5
11.300	156.090	67.053	169.882	0.10713	0.00813	0.40574	-0.17268	1.4630	1.4649	-0.0004	0.4476	0.9986	-973.7
11.350	156.067	67.092	169.877	0.10753	0.00808	0.40601	-0.17268	1.4617	1.4640	-0.0006	0.4483	0.9984	-977.9
11.400	156.043	67.133	169.871	0.10794	0.00801	0.40628	-0.17268	1.4604	1.4632	-0.0007	0.4491	0.9981	-982.1
11.450	156.018	67.173	169.865	0.10833	0.00793	0.40656	-0.17268	1.4590	1.4623	-0.0009	0.4498	0.9977	-986.3
11.500	155.992	67.215	169.857	0.10873	0.00784	0.40685	-0.17268	1.4575	1.4615	-0.0010	0.4506	0.9973	-990.6
11.550	155.964	67.257	169.848	0.10912	0.00773	0.40714	-0.17268	1.4558	1.4606	-0.0011	0.4514	0.9967	-994.8
11.600	155.935	67.299	169.838	0.10950	0.00761	0.40743	-0.17268	1.4541	1.4597	-0.0013	0.4522	0.9961	-999.0
11.650	155.905	67.342	169.827	0.10988	0.00748	0.40774	-0.17268	1.4522	1.4589	-0.0014	0.4531	0.9954	-1003.2
11.700	155.873	67.386	169.816	0.11025	0.00733	0.40805	-0.17268	1.4502	1.4579	-0.0015	0.4540	0.9947	-1007.4
11.750	155.840	67.430	169.803	0.11061	0.00718	0.40837	-0.17268	1.4480	1.4570	-0.0016	0.4549	0.9939	-1011.6
11.800	155.806	67.476	169.789	0.11097	0.00701	0.40869	-0.17268	1.4457	1.4559	-0.0018	0.4558	0.9930	-1015.8
11.850	155.770	67.522	169.775	0.11131	0.00683	0.40902	-0.17268	1.4432	1.4548	-0.0019	0.4568	0.9920	-1020.0
11.900	155.732	67.569	169.759	0.11165	0.00664	0.40936	-0.17268	1.4406	1.4536	-0.0020	0.4579	0.9910	-1024.2
11.950	155.693	67.616	169.742	0.11198	0.00643	0.40971	-0.17268	1.4378	1.4524	-0.0022	0.4590	0.9899	-1028.4
12.000	155.653	67.665	169.725	0.11229	0.00620	0.41007	-0.17268	1.4347	1.4511	-0.0024	0.4602	0.9887	-1032.6
12.050	155.611	67.715	169.706	0.11260	0.00595	0.41044	-0.17268	1.4315	1.4498	-0.0027	0.4615	0.9874	-1036.8
12.100	155.566	67.766	169.685	0.11289	0.00567	0.41082	-0.17268	1.4280	1.4485	-0.0031	0.4629	0.9858	-1041.1
12.150	155.520	67.818	169.664	0.11316	0.00534	0.41121	-0.17268	1.4243	1.4473	-0.0036	0.4645	0.9841	-1045.3
12.200	155.473	67.870	169.641	0.11342	0.00496	0.41161	-0.17268	1.4204	1.4464	-0.0042	0.4662	0.9820	-1049.5
12.250	155.423	67.923	169.617	0.11366	0.00451	0.41201	-0.17268	1.4162	1.4457	-0.0050	0.4681	0.9796	-1053.7
12.300	155.371	67.976	169.591	0.11387	0.00397	0.41242	-0.17268	1.4119	1.4456	-0.0059	0.4703	0.9767	-1057.9
12.350	155.318	68.028	169.562	0.11405	0.00333	0.41282	-0.17268	1.4074	1.4461	-0.0071	0.4726	0.9732	-1062.1
12.400	155.263	68.079	169.532	0.11420	0.00257	0.41323	-0.17268	1.4028	1.4475	-0.0084	0.4751	0.9691	-1066.3
12.450	155.206	68.127	169.500	0.11431	0.00166	0.41362	-0.17268	1.3982	1.4499	-0.0099	0.4778	0.9643	-1070.5
12.500	155.149	68.171	169.465	0.11436	0.00061	0.41400	-0.17268	1.3936	1.4538	-0.0116	0.4806	0.9586	-1074.8
12.550	155.092	68.211	169.429	0.11436	-0.00062	0.41435	-0.17268	1.3893	1.4592	-0.0133	0.4834	0.9521	-1079.0
12.600	155.035	68.244	169.390	0.11430	-0.00200	0.41466	-0.17268	1.3853	1.4665	-0.0149	0.4860	0.9447	-1083.2
12.650	154.979	68.268	169.349	0.11416	-0.00354	0.41493	-0.17268	1.3819	1.4757	-0.0164	0.4885	0.9365	-1087.4
12.700	154.926	68.284	169.307	0.11394	-0.00522	0.41514	-0.17268	1.3791	1.4869	-0.0176	0.4905	0.9275	-1091.7
12.750	154.877	68.288	169.264	0.11364	-0.00698	0.41528	-0.17268	1.3773	1.5001	-0.0182	0.4918	0.9181	-1095.9
12.800	154.833	68.280	169.220	0.11324	-0.00878	0.41534	-0.17268	1.3764	1.5150	-0.0183	0.4925	0.9086	-1100.2
12.850	154.796	68.260	169.178	0.11276	-0.01055	0.41532	-0.17268	1.3767	1.5312	-0.0177	0.4923	0.8991	-1104.4
12.900	154.766	68.226	169.137	0.11219	-0.01223	0.41521	-0.17268	1.3782	1.5483	-0.0165	0.4912	0.8901	-1108.7
12.950	154.745	68.180	169.099	0.11154	-0.01376	0.41501	-0.17268	1.3808	1.5656	-0.0146	0.4892	0.8820	-1112.9
13.000	154.733	68.121	169.064	0.11082	-0.01508	0.41472	-0.17268	1.3846	1.5825	-0.0123	0.4866	0.8749	-1117.2
13.050	154.730	68.050	169.033	0.11004	-0.01615	0.41434	-0.17268	1.3894	1.5984	-0.0096	0.4833	0.8692	-1121.5
13.100	154.736	67.970	169.006	0.10921	-0.01696	0.41389	-0.17268	1.3949	1.6129	-0.0069	0.4798	0.8648	-1125.7
13.150	154.751	67.880	168.984	0.10834	-0.01751	0.41337	-0.17268	1.4012	1.6257	-0.0044	0.4760	0.8619	-1130.0
13.200	154.775	67.783	168.967	0.10746	-0.01782	0.41279	-0.17268	1.4078	1.6367	-0.0021	0.4724	0.8601	-1134.3
13.250	154.806	67.680	168.954	0.10656	-0.01793	0.41215	-0.17268	1.4147	1.6459	-0.0001	0.4689	0.8595	-1138.6
13.300	154.843	67.571	168.945	0.10567	-0.01787	0.41147	-0.17268	1.4217	1.6535	0.0013	0.4656	0.8598	-1142.9
13.350	154.886	67.458	168.939	0.10478	-0.01768	0.41076	-0.17268	1.4286	1.6597	0.0024	0.4626	0.8607	-1147.2
13.400	154.935	67.342	168.937	0.10390	-0.01741	0.41001	-0.17268	1.4352	1.6648	0.0031	0.4600	0.8621	-1151.5
13.450	154.987	67.223	168.938	0.10304	-0.01708	0.40924	-0.17268	1.4416	1.6689	0.0035	0.4575	0.8638	-1155.8
13.500	155.043	67.101	168.941	0.10219	-0.01672	0.40845	-0.17268	1.4474	1.6721	0.0038	0.4551	0.8657	-1160.1
13.550	155.103	66.978	168.947	0.10137	-0.01634	0.40764	-0.17268	1.4528	1.6744	0.0041	0.4528	0.8677	-1164.4
13.600	155.165	66.854	168.955	0.10056	-0.01592	0.40682	-0.17268	1.4576	1.6756	0.0045	0.4505	0.8699	-1168.7
13.650	155.230	66.729	168.965	0.09978	-0.01546	0.40599	-0.17268	1.4618	1.6759	0.0048	0.4483	0.8723	-1173.0
13.700	155.297	66.605	168.978	0.09902	-0.01497	0.40516	-0.17268	1.4654	1.6750	0.0052	0.4461	0.8749	-1177.3
13.750	155.366	66.482	168.993	0.09828	-0.01444	0.40433	-0.17268	1.4684	1.6730	0.0056	0.4439	0.8777	-1181.6
13.800	155.436	66.362	169.009	0.09757	-0.01386	0.40351	-0.17268	1.4709	1.6700	0.0061	0.4419	0.8807	-1185.9
13.850	155.506	66.244	169.028	0.09690	-0.01325	0.40271	-0.17268	1.4728	1.6660	0.0065	0.4399	0.8840	-1190.2
13.900	155.577	66.130	169.048	0.09625	-0.01259	0.40192	-0.17268	1.4742	1.6610	0.0069	0.4380	0.8875	-1194.5
13.950	155.647	66.020	169.070	0.09564	-0.01189	0.40117	-0.17268	1.4751	1.6552	0.0074	0.4362	0.8912	-1198.8
14.000	155.717	65.916	169.094	0.09506	-0.01115	0.40044	-0.17268	1.4757	1.6485	0.0078	0.4346	0.8952	-1203.1
14.050	155.785	65.817	169.118	0.09452	-0.01036	0.39974	-0.17268	1.4759	1.6412	0.0082	0.4330	0.8993	-1207.4
14.100	155.853	65.725	169.144	0.09403	-0.00955	0.39908	-0.17268	1.4759	1.6332	0.0085	0.4316	0.9036	-1211.7
14.150	155.918	65.639	169.171	0.09357	-0.00869	0.39846	-0.17268	1.4756	1.6248	0.0089	0.4302	0.9082	-1216.0
14.200	155.982	65.560	169.199	0.09316	-0.00781	0.39789	-0.17268	1.4752	1.6161	0.0091	0.4290	0.9128	-1220.2
14.250	156.043	65.488	169.228	0.09279	-0.00690	0.39736	-0.17268	1.4747	1.6070	0.0094	0.4279	0.9177	-1224.5
14.300	156.102	65.424	169.257	0.09247	-0.00597	0.39687	-0.17268	1.4741	1.5977	0.0096	0.4269	0.9226	-1228.8
14.350	156.158	65.368	169.287	0.09219	-0.00502	0.39644	-0.17268	1.4735	1.5884	0.0098	0.4260	0.9277	-1233.1
14.400	156.211	65.319	169.318	0.09197	-0.00405	0.39605	-0.17268	1.4729	1.5790	0.0099	0.4253	0.9328	-1237.4
14.450	156.262	65.278	169.349	0.09179	-0.00307	0.39571	-0.17268	1.4723	1.5696	0.0100	0.4246	0.9380	-1241.7
14.500	156.309	65.245	169.380	0.09166	-0.00209	0.39543	-0.17268	1.4718	1.5604	0.0100	0.4240	0.9432	-1245.9
14.550	156.354	65.220	169.411	0.09158	-0.00110	0.39519	-0.17268	1.4713	1.5513	0.0100	0.4236	0.9485	-1250.2
14.600	156.395	65.203	169.442	0.09155	-0.00012	0.39500	-0.17268	1.4709	1.5424	0.0100	0.4232	0.9537	-1254.5
14.650	156.433	65.193	169.474	0.09157	0.00085	0.39486	-0.17268	1.4706	1.5337	0.0099	0.4230	0.9589	-1258.8
14.700	156.467	65.190	169.505	0.09163	0.00182	0.39476	-0.17268	1.4704	1.5254	0.0097	0.4228	0.9640	-1263.1
14.750	156.499	65.194	169.535	0.09175	0.00277	0.39472	-0.17268	1.4703	1.5173	0.0096	0.4227	0.9690	-1267.3
14.800	156.527	65.205	169.566	0.09191	0.00370	0.39471	-0.17268	1.4703	1.5096	0.0093	0.4227	0.9740	-1271.6
14.850	156.552	65.223	169.596	0.09212	0.00461	0.39475	-0.17268	1.4704	1.5022	0.0091	0.4228	0.9788	-1275.9
14.900	156.574	65.247	169.625	0.09237	0.00549	0.39483	-0.17268	1.4706	1.4952	0.0088	0.4229	0.9835	-1280.1

TIME	X VEL	Z VEL	A/C VEL	THETA	THETA DOT	AOA	DE	CL	CL-*	CM	CD	ANFP	ALT
14.950	156.593	65.277	169.654	0.09267	0.00634	0.39495	-0.17268	1.4708	1.4885	0.0085	0.4231	0.9881	-1284.4
15.000	156.608	65.313	169.682	0.09300	0.00717	0.39511	-0.17268	1.4712	1.4823	0.0082	0.4234	0.9925	-1288.7
15.050	156.621	65.353	169.709	0.09338	0.00796	0.39531	-0.17268	1.4715	1.4764	0.0078	0.4238	0.9967	-1292.9
15.100	156.630	65.399	169.736	0.09380	0.00871	0.39553	-0.17268	1.4720	1.4708	0.0074	0.4243	1.0008	-1297.2
15.150	156.637	65.450	169.761	0.09425	0.00943	0.39579	-0.17268	1.4724	1.4657	0.0070	0.4248	1.0046	-1301.5
15.200	156.641	65.504	169.786	0.09474	0.01010	0.39608	-0.17268	1.4729	1.4609	0.0066	0.4253	1.0082	-1305.7
15.250	156.642	65.563	169.809	0.09526	0.01073	0.39640	-0.17268	1.4734	1.4565	0.0062	0.4260	1.0117	-1310.0
15.300	156.640	65.625	169.831	0.09581	0.01132	0.39674	-0.17268	1.4739	1.4524	0.0058	0.4267	1.0148	-1314.2
15.350	156.635	65.690	169.852	0.09639	0.01187	0.39710	-0.17268	1.4744	1.4486	0.0053	0.4274	1.0178	-1318.5
15.400	156.628	65.759	169.872	0.09700	0.01237	0.39749	-0.17268	1.4748	1.4452	0.0049	0.4282	1.0205	-1322.7
15.450	156.618	65.830	169.890	0.09763	0.01283	0.39790	-0.17268	1.4752	1.4420	0.0044	0.4290	1.0230	-1327.0
15.500	156.606	65.903	169.907	0.09828	0.01324	0.39832	-0.17268	1.4755	1.4392	0.0039	0.4299	1.0253	-1331.2
15.550	156.591	65.978	169.923	0.09895	0.01361	0.39877	-0.17268	1.4758	1.4366	0.0035	0.4309	1.0273	-1335.4
15.600	156.574	66.055	169.937	0.09964	0.01393	0.39922	-0.17268	1.4759	1.4343	0.0030	0.4319	1.0290	-1339.7
15.650	156.555	66.134	169.950	0.10035	0.01420	0.39969	-0.17268	1.4759	1.4321	0.0026	0.4329	1.0306	-1343.9
15.700	156.533	66.214	169.961	0.10106	0.01443	0.40018	-0.17268	1.4758	1.4302	0.0021	0.4340	1.0319	-1348.2
15.750	156.509	66.295	169.971	0.10179	0.01462	0.40067	-0.17268	1.4755	1.4285	0.0017	0.4351	1.0329	-1352.4
15.800	156.483	66.377	169.979	0.10252	0.01476	0.40118	-0.17268	1.4751	1.4270	0.0012	0.4363	1.0337	-1356.6
15.850	156.454	66.460	169.985	0.10326	0.01487	0.40169	-0.17268	1.4745	1.4255	0.0008	0.4374	1.0343	-1360.8
15.900	156.424	66.543	169.989	0.10401	0.01492	0.40221	-0.17268	1.4737	1.4243	0.0004	0.4387	1.0347	-1365.1
15.950	156.391	66.627	169.992	0.10476	0.01494	0.40274	-0.17268	1.4727	1.4231	0.0000	0.4400	1.0349	-1369.3
16.000	156.357	66.711	169.994	0.10550	0.01493	0.40328	-0.17268	1.4715	1.4219	-0.0004	0.4413	1.0349	-1373.5
16.050	156.320	66.796	169.993	0.10625	0.01487	0.40382	-0.17268	1.4700	1.4208	-0.0008	0.4426	1.0346	-1377.7
16.100	156.281	66.882	169.991	0.10699	0.01478	0.40437	-0.17268	1.4683	1.4198	-0.0011	0.4440	1.0342	-1381.9
16.150	156.240	66.967	169.987	0.10773	0.01465	0.40493	-0.17268	1.4663	1.4187	-0.0014	0.4455	1.0336	-1386.1
16.200	156.196	67.053	169.981	0.10845	0.01449	0.40550	-0.17268	1.4640	1.4176	-0.0018	0.4469	1.0328	-1390.3
16.250	156.151	67.140	169.973	0.10917	0.01430	0.40607	-0.17268	1.4614	1.4164	-0.0021	0.4485	1.0318	-1394.5
16.300	156.103	67.227	169.963	0.10988	0.01408	0.40665	-0.17268	1.4585	1.4151	-0.0024	0.4501	1.0307	-1398.7
16.350	156.053	67.314	169.952	0.11058	0.01384	0.40724	-0.17268	1.4552	1.4136	-0.0026	0.4517	1.0294	-1402.9
16.400	156.000	67.403	169.939	0.11127	0.01357	0.40784	-0.17268	1.4515	1.4120	-0.0029	0.4534	1.0280	-1407.1
16.450	155.945	67.493	169.924	0.11194	0.01327	0.40846	-0.17268	1.4474	1.4101	-0.0031	0.4551	1.0264	-1411.3
16.500	155.887	67.584	169.907	0.11259	0.01295	0.40908	-0.17268	1.4428	1.4079	-0.0033	0.4570	1.0248	-1415.5
16.550	155.826	67.677	169.888	0.11323	0.01261	0.40973	-0.17268	1.4376	1.4054	-0.0036	0.4590	1.0229	-1419.7
16.600	155.762	67.771	169.867	0.11385	0.01223	0.41039	-0.17268	1.4319	1.4026	-0.0041	0.4613	1.0209	-1423.9
16.650	155.694	67.868	169.843	0.11446	0.01179	0.41107	-0.17268	1.4256	1.3996	-0.0048	0.4639	1.0186	-1428.1
16.700	155.622	67.967	169.817	0.11503	0.01126	0.41177	-0.17268	1.4187	1.3967	-0.0060	0.4670	1.0157	-1432.3
16.750	155.546	68.067	169.787	0.11558	0.01059	0.41249	-0.17268	1.4110	1.3941	-0.0077	0.4707	1.0121	-1436.5
16.800	155.466	68.168	169.754	0.11609	0.00972	0.41323	-0.17268	1.4028	1.3924	-0.0101	0.4751	1.0075	-1440.7
16.850	155.381	68.268	169.716	0.11655	0.00857	0.41397	-0.17268	1.3940	1.3922	-0.0133	0.4803	1.0013	-1444.8
16.900	155.291	68.364	169.673	0.11694	0.00707	0.41470	-0.17268	1.3848	1.3941	-0.0173	0.4864	0.9933	-1449.0
16.950	155.197	68.455	169.624	0.11725	0.00513	0.41541	-0.17268	1.3754	1.3993	-0.0221	0.4932	0.9829	-1453.3
17.000	155.101	68.536	169.568	0.11744	0.00269	0.41608	-0.17268	1.3663	1.4087	-0.0275	0.5005	0.9699	-1457.5
17.050	155.004	68.602	169.506	0.11751	-0.00028	0.41667	-0.17268	1.3580	1.4233	-0.0327	0.5074	0.9541	-1461.7
17.100	154.909	68.649	169.438	0.11741	-0.00372	0.41715	-0.17268	1.3511	1.4437	-0.0369	0.5133	0.9358	-1465.9
17.150	154.819	68.673	169.366	0.11713	-0.00750	0.41749	-0.17268	1.3461	1.4700	-0.0398	0.5177	0.9157	-1470.1
17.200	154.739	68.671	169.292	0.11665	-0.01148	0.41767	-0.17268	1.3435	1.5017	-0.0408	0.5199	0.8946	-1474.3
17.250	154.673	68.640	169.219	0.11598	-0.01546	0.41767	-0.17268	1.3436	1.5381	-0.0398	0.5198	0.8735	-1478.6
17.300	154.622	68.579	169.148	0.11511	-0.01923	0.41746	-0.17268	1.3466	1.5777	-0.0367	0.5172	0.8535	-1482.8
17.350	154.590	68.490	169.083	0.11406	-0.02259	0.41705	-0.17268	1.3525	1.6183	-0.0315	0.5121	0.8357	-1487.1
17.400	154.579	68.373	169.026	0.11286	-0.02535	0.41645	-0.17268	1.3611	1.6577	-0.0246	0.5048	0.8211	-1491.3
17.450	154.589	68.234	168.978	0.11154	-0.02738	0.41567	-0.17268	1.3719	1.6931	-0.0168	0.4959	0.8103	-1495.6
17.500	154.619	68.075	168.942	0.11014	-0.02864	0.41474	-0.17268	1.3843	1.7227	-0.0092	0.4867	0.8036	-1499.9
17.550	154.667	67.901	168.915	0.10869	-0.02922	0.41368	-0.17268	1.3974	1.7459	-0.0030	0.4782	0.8004	-1504.2
17.600	154.729	67.716	168.898	0.10722	-0.02928	0.41253	-0.17268	1.4107	1.7633	0.0015	0.4709	0.8000	-1508.4
17.650	154.803	67.522	168.888	0.10577	-0.02899	0.41130	-0.17268	1.4234	1.7759	0.0043	0.4649	0.8015	-1512.7
17.700	154.886	67.322	168.884	0.10433	-0.02850	0.41002	-0.17268	1.4352	1.7849	0.0057	0.4600	0.8041	-1517.0
17.750	154.976	67.117	168.886	0.10292	-0.02791	0.40869	-0.17268	1.4457	1.7912	0.0063	0.4558	0.8071	-1521.3
17.800	155.072	66.909	168.891	0.10154	-0.02726	0.40734	-0.17268	1.4547	1.7948	0.0068	0.4520	0.8105	-1525.6
17.850	155.173	66.699	168.900	0.10019	-0.02656	0.40596	-0.17268	1.4620	1.7956	0.0075	0.4482	0.8142	-1529.9
17.900	155.277	66.490	168.914	0.09888	-0.02580	0.40458	-0.17268	1.4676	1.7937	0.0081	0.4446	0.8182	-1534.2
17.950	155.383	66.284	168.930	0.09761	-0.02497	0.40321	-0.17268	1.4716	1.7891	0.0089	0.4411	0.8226	-1538.5
18.000	155.491	66.082	168.950	0.09639	-0.02406	0.40186	-0.17268	1.4743	1.7819	0.0097	0.4379	0.8273	-1542.8
18.050	155.599	65.886	168.973	0.09521	-0.02308	0.40055	-0.17268	1.4756	1.7724	0.0105	0.4348	0.8325	-1547.1
18.100	155.706	65.698	168.999	0.09408	-0.02201	0.39927	-0.17268	1.4759	1.7609	0.0113	0.4320	0.8382	-1551.4
18.150	155.812	65.519	169.027	0.09301	-0.02087	0.39805	-0.17268	1.4753	1.7477	0.0121	0.4294	0.8442	-1555.7
18.200	155.916	65.351	169.058	0.09200	-0.01966	0.39690	-0.17268	1.4741	1.7331	0.0128	0.4270	0.8506	-1559.9
18.250	156.017	65.193	169.090	0.09104	-0.01837	0.39581	-0.17268	1.4725	1.7174	0.0135	0.4248	0.8574	-1564.2
18.300	156.115	65.048	169.125	0.09016	-0.01702	0.39479	-0.17268	1.4705	1.7010	0.0141	0.4228	0.8645	-1568.5
18.350	156.209	64.916	169.160	0.08934	-0.01561	0.39386	-0.17268	1.4684	1.6841	0.0146	0.4211	0.8719	-1572.8
18.400	156.299	64.796	169.198	0.08860	-0.01416	0.39300	-0.17268	1.4662	1.6670	0.0151	0.4195	0.8796	-1577.1
18.450	156.384	64.691	169.236	0.08793	-0.01266	0.39223	-0.17268	1.4641	1.6498	0.0154	0.4181	0.8874	-1581.4
18.500	156.465	64.598	169.276	0.08733	-0.01113	0.39154	-0.17268	1.4622	1.6328	0.0157	0.4169	0.8955	-1585.6
18.550	156.541	64.519	169.316	0.08681	-0.00958	0.39094	-0.17268	1.4604	1.6160	0.0159	0.4159	0.9037	-1589.9
18.600	156.613	64.454	169.357	0.08638	-0.00801	0.39042	-0.17268	1.4588	1.5996	0.0160	0.4150	0.9120	-1594.2
18.650	156.679	64.402	169.399	0.08601	-0.00643	0.38999	-0.17268	1.4574	1.5837	0.0161	0.4143	0.9203	-1598.5

TIME	X VEL	Z VEL	A/C VEL	THETA	THETA DOT	AOA	DE	CL	CL-*	CM	CD	ANFP	ALT
18.700	156.741	64.363	169.441	0.08573	-0.00485	0.38964	-0.17268	1.4563	1.5683.	0.0160	0.4137	0.9286	-1602.8
18.750	156.797	64.336	169.483	0.08553	-0.00328	0.38937	-0.17268	1.4555	1.5535	0.0159	0.4133	0.9369	-1607.1
18.800	156.849	64.322	169.525	0.08540	-0.00172	0.38917	-0.17268	1.4549	1.5393	0.0157	0.4129	0.9452	-1611.3
18.850	156.895	64.320	169.567	0.08536	-0.00018	0.38906	-0.17268	1.4545	1.5258	0.0155	0.4127	0.9533	-1615.6
18.900	156.937	64.329	169.609	0.08539	0.00133	0.38902	-0.17268	1.4544	1.5130	0.0152	0.4127	0.9613	-1619.9
18.950	156.973	64.349	169.651	0.08549	0.00281	0.38904	-0.17268	1.4544	1.5008	0.0148	0.4127	0.9691	-1624.2
19.000	157.005	64.380	169.692	0.08567	0.00425	0.38914	-0.17268	1.4547	1.4894	0.0144	0.4129	0.9767	-1628.5
19.050	157.033	64.420	169.733	0.08591	0.00565	0.38930	-0.17268	1.4553	1.4787	0.0139	0.4131	0.9841	-1632.7
19.100	157.056	64.470	169.773	0.08623	0.00700	0.38952	-0.17268	1.4560	1.4688	0.0134	0.4135	0.9913	-1637.0
19.150	157.074	64.529	169.812	0.08661	0.00830	0.38980	-0.17268	1.4568	1.4595	0.0129	0.4140	0.9982	-1641.3
19.200	157.088	64.595	169.850	0.08706	0.00954	0.39013	-0.17268	1.4579	1.4509	0.0123	0.4145	1.0048	-1645.6
19.250	157.098	64.670	169.888	0.08756	0.01072	0.39051	-0.17268	1.4591	1.4431	0.0116	0.4152	1.0111	-1649.9
19.300	157.103	64.751	169.924	0.08813	0.01184	0.39094	-0.17268	1.4604	1.4359	0.0110	0.4159	1.0170	-1654.2
19.350	157.105	64.838	169.959	0.08875	0.01289	0.39141	-0.17268	1.4618	1.4294	0.0103	0.4167	1.0227	-1658.4
19.400	157.103	64.931	169.992	0.08942	0.01388	0.39192	-0.17268	1.4632	1.4235	0.0096	0.4176	1.0279	-1662.7
19.450	157.098	65.028	170.025	0.09013	0.01480	0.39246	-0.17268	1.4648	1.4182	0.0089	0.4185	1.0329	-1667.0
19.500	157.088	65.131	170.055	0.09090	0.01564	0.39304	-0.17268	1.4663	1.4135	0.0082	0.4196	1.0374	-1671.3
19.550	157.076	65.237	170.084	0.09170	0.01642	0.39364	-0.17268	1.4678	1.4093	0.0074	0.4207	1.0416	-1675.5
19.600	157.060	65.346	170.112	0.09254	0.01712	0.39427	-0.17268	1.4693	1.4056	0.0067	0.4218	1.0453	-1679.8
19.650	157.041	65.458	170.137	0.09341	0.01775	0.39492	-0.17268	1.4708	1.4024	0.0060	0.4231	1.0487	-1684.1
19.700	157.020	65.572	170.161	0.09431	0.01830	0.39559	-0.17268	1.4721	1.3996	0.0052	0.4244	1.0518	-1688.3
19.750	156.995	65.688	170.183	0.09524	0.01878	0.39628	-0.17268	1.4732	1.3972	0.0045	0.4257	1.0544	-1692.6
19.800	156.967	65.806	170.203	0.09619	0.01919	0.39698	-0.17268	1.4742	1.3952	0.0038	0.4271	1.0566	-1696.9
19.850	156.937	65.924	170.221	0.09716	0.01953	0.39769	-0.17268	1.4750	1.3935	0.0031	0.4286	1.0585	-1701.1
19.900	156.904	66.044	170.237	0.09814	0.01981	0.39841	-0.17268	1.4756	1.3920	0.0024	0.4301	1.0601	-1705.4
19.950	156.868	66.163	170.250	0.09914	0.02001	0.39914	-0.17268	1.4759	1.3907	0.0017	0.4317	1.0612	-1709.6
20.000	156.830	66.283	170.262	0.10014	0.02015	0.39987	-0.17268	1.4759	1.3897	0.0011	0.4333	1.0620	-1713.9
20.050	156.789	66.403	170.271	0.10115	0.02022	0.40062	-0.17268	1.4756	1.3887	0.0005	0.4350	1.0625	-1718.1
20.100	156.746	66.523	170.278	0.10216	0.02024	0.40136	-0.17268	1.4749	1.3879	-0.0001	0.4367	1.0627	-1722.4
20.150	156.700	66.643	170.283	0.10317	0.02020	0.40212	-0.17268	1.4739	1.3871	-0.0007	0.4385	1.0625	-1726.6
20.200	156.652	66.763	170.285	0.10418	0.02010	0.40287	-0.17268	1.4724	1.3863	-0.0012	0.4403	1.0621	-1730.8
20.250	156.601	66.882	170.285	0.10518	0.01995	0.40364	-0.17268	1.4705	1.3855	-0.0018	0.4422	1.0614	-1735.1
20.300	156.547	67.001	170.283	0.10617	0.01975	0.40440	-0.17268	1.4682	1.3846	-0.0022	0.4441	1.0604	-1739.3
20.350	156.491	67.120	170.278	0.10716	0.01951	0.40518	-0.17268	1.4654	1.3835	-0.0027	0.4461	1.0592	-1743.5
20.400	156.432	67.240	170.271	0.10812	0.01922	0.40596	-0.17268	1.4620	1.3822	-0.0031	0.4482	1.0577	-1747.7
20.450	156.369	67.360	170.261	0.10908	0.01890	0.40675	-0.17268	1.4580	1.3806	-0.0035	0.4503	1.0560	-1752.0
20.500	156.304	67.480	170.248	0.11001	0.01854	0.40755	-0.17268	1.4534	1.3787	-0.0038	0.4526	1.0541	-1756.2
20.550	156.235	67.602	170.234	0.11093	0.01814	0.40837	-0.17268	1.4480	1.3764	-0.0041	0.4549	1.0521	-1760.4
20.600	156.163	67.725	170.216	0.11183	0.01772	0.40920	-0.17268	1.4419	1.3734	-0.0044	0.4573	1.0498	-1764.6
20.650	156.086	67.850	170.196	0.11270	0.01725	0.41006	-0.17268	1.4349	1.3700	-0.0049	0.4601	1.0474	-1768.8
20.700	156.005	67.978	170.173	0.11355	0.01673	0.41094	-0.17268	1.4269	1.3660	-0.0057	0.4633	1.0446	-1773.0
20.750	155.919	68.109	170.146	0.11437	0.01610	0.41184	-0.17268	1.4180	1.3618	-0.0072	0.4673	1.0412	-1777.2
20.800	155.827	68.242	170.115	0.11516	0.01527	0.41278	-0.17268	1.4079	1.3580	-0.0096	0.4723	1.0368	-1781.5
20.850	155.728	68.376	170.078	0.11590	0.01415	0.41373	-0.17268	1.3969	1.3552	-0.0133	0.4786	1.0308	-1785.7
20.900	155.622	68.508	170.034	0.11657	0.01259	0.41469	-0.17268	1.3849	1.3546	-0.0185	0.4863	1.0224	-1789.9
20.950	155.509	68.636	169.982	0.11714	0.01043	0.41565	-0.17268	1.3723	1.3575	-0.0253	0.4957	1.0109	-1794.1
21.000	155.390	68.753	169.920	0.11760	0.00754	0.41656	-0.17268	1.3596	1.3658	-0.0333	0.5061	0.9955	-1798.3
21.050	155.267	68.853	169.849	0.11788	0.00384	0.41739	-0.17268	1.3476	1.3811	-0.0413	0.5164	0.9758	-1802.5
21.100	155.145	68.930	169.768	0.11797	-0.00058	0.41810	-0.17268	1.3373	1.4044	-0.0480	0.5252	0.9522	-1806.8
21.150	155.028	68.977	169.681	0.11782	-0.00557	0.41863	-0.17268	1.3295	1.4362	-0.0527	0.5319	0.9257	-1811.0
21.200	154.923	68.989	169.590	0.11741	-0.01090	0.41895	-0.17268	1.3248	1.4762	-0.0549	0.5358	0.8974	-1815.3
21.250	154.833	68.964	169.497	0.11673	-0.01631	0.41903	-0.17268	1.3237	1.5236	-0.0544	0.5367	0.8687	-1819.5
21.300	154.765	68.898	169.408	0.11578	-0.02153	0.41884	-0.17268	1.3264	1.5770	-0.0512	0.5345	0.8411	-1823.8
21.350	154.720	68.792	169.324	0.11458	-0.02629	0.41838	-0.17268	1.3332	1.6341	-0.0451	0.5288	0.8158	-1828.0
21.400	154.702	68.649	169.250	0.11316	-0.03030	0.41764	-0.17268	1.3438	1.6912	-0.0361	0.5196	0.7946	-1832.3
21.450	154.713	68.473	169.189	0.11157	-0.03331	0.41666	-0.17268	1.3580	1.7440	-0.0249	0.5074	0.7787	-1836.6
21.500	154.753	68.269	169.142	0.10985	-0.03517	0.41547	-0.17268	1.3746	1.7881	-0.0132	0.4938	0.7688	-1840.9
21.550	154.817	68.045	169.111	0.10807	-0.03596	0.41410	-0.17268	1.3923	1.8212	-0.0036	0.4814	0.7645	-1845.2
21.600	154.902	67.806	169.092	0.10627	-0.03597	0.41261	-0.17268	1.4098	1.8443	0.0028	0.4713	0.7644	-1849.5
21.650	155.001	67.557	169.083	0.10448	-0.03551	0.41102	-0.17268	1.4261	1.8598	0.0063	0.4637	0.7668	-1853.8
21.700	155.111	67.300	169.082	0.10272	-0.03481	0.40937	-0.17268	1.4406	1.8699	0.0076	0.4579	0.7704	-1858.1
21.750	155.229	67.037	169.086	0.10100	-0.03403	0.40767	-0.17268	1.4526	1.8756	0.0083	0.4529	0.7745	-1862.4
21.800	155.353	66.773	169.095	0.09932	-0.03318	0.40594	-0.17268	1.4621	1.8769	0.0091	0.4481	0.7790	-1866.7
21.850	155.481	66.509	169.109	0.09768	-0.03225	0.40421	-0.17268	1.4688	1.8739	0.0099	0.4436	0.7839	-1871.1
21.900	155.612	66.248	169.127	0.09609	-0.03123	0.40249	-0.17268	1.4732	1.8666	0.0109	0.4393	0.7892	-1875.4
21.950	155.745	65.994	169.150	0.09456	-0.03011	0.40080	-0.17268	1.4754	1.8555	0.0120	0.4354	0.7952	-1879.7
22.000	155.877	65.748	169.176	0.09308	-0.02889	0.39915	-0.17268	1.4759	1.8411	0.0130	0.4317	0.8016	-1884.0
22.050	156.007	65.513	169.205	0.09167	-0.02756	0.39757	-0.17268	1.4749	1.8239	0.0141	0.4284	0.8086	-1888.3
22.100	156.135	65.291	169.237	0.09033	-0.02613	0.39607	-0.17268	1.4729	1.8046	0.0151	0.4253	0.8162	-1892.6
22.150	156.260	65.083	169.272	0.08906	-0.02460	0.39465	-0.17268	1.4702	1.7837	0.0160	0.4226	0.8242	-1896.9
22.200	156.381	64.890	169.309	0.08787	-0.02299	0.39333	-0.17268	1.4671	1.7617	0.0169	0.4201	0.8327	-1901.2
22.250	156.496	64.714	169.349	0.08676	-0.02130	0.39210	-0.17268	1.4638	1.7392	0.0176	0.4179	0.8417	-1905.5
22.300	156.607	64.554	169.390	0.08574	-0.01953	0.39098	-0.17268	1.4605	1.7163	0.0182	0.4160	0.8509	-1909.8
22.350	156.712	64.411	169.433	0.08481	-0.01771	0.38997	-0.17268	1.4574	1.6936	0.0188	0.4142	0.8605	-1914.1
22.400	156.811	64.285	169.477	0.08397	-0.01585	0.38906	-0.17268	1.4545	1.6712	0.0192	0.4127	0.8703	-1918.4

TIME	X VEL	Z VEL	A/C VEL	THETA	THETA DOT	AOA	DE	CL	CL-*	CM	CD	ANFP	ALT
22.450	156.905	64.176	169.522	0.08323	-0.01395	0.38825	-0.17268	1.4519	1.6492	0.0195	0.4115	0.8804	-1922.7
22.500	156.992	64.084	169.568	0.08258	-0.01202	0.38756	-0.17268	1.4497	1.6279	0.0196	0.4104	0.8905	-1927.0
22.550	157.074	64.009	169.615	0.08203	-0.01008	0.38696	-0.17268	1.4478	1.6074	0.0197	0.4094	0.9007	-1931.3
22.600	157.149	63.950	169.663	0.08157	-0.00814	0.38647	-0.17268	1.4462	1.5876	0.0197	0.4087	0.9110	-1935.6
22.650	157.218	63.907	169.711	0.08121	-0.00620	0.38609	-0.17268	1.4450	1.5686	0.0196	0.4081	0.9212	-1939.9
22.700	157.281	63.880	169.759	0.08095	-0.00427	0.38580	-0.17268	1.4441	1.5506	0.0194	0.4077	0.9313	-1944.2
22.750	157.339	63.867	169.807	0.08078	-0.00237	0.38560	-0.17268	1.4435	1.5334	0.0191	0.4074	0.9414	-1948.5
22.800	157.390	63.869	169.855	0.08071	-0.00050	0.38550	-0.17268	1.4432	1.5171	0.0188	0.4072	0.9513	-1952.8
22.850	157.435	63.885	169.903	0.08073	0.00134	0.38548	-0.17268	1.4432	1.5017	0.0184	0.4072	0.9610	-1957.1
22.900	157.475	63.914	169.951	0.08085	0.00314	0.38556	-0.17268	1.4434	1.4872	0.0179	0.4073	0.9705	-1961.4
22.950	157.509	63.956	169.998	0.08105	0.00488	0.38571	-0.17268	1.4439	1.4737	0.0174	0.4075	0.9798	-1965.7
23.000	157.537	64.010	170.045	0.08133	0.00658	0.38594	-0.17268	1.4446	1.4610	0.0168	0.4079	0.9887	-1970.0
23.050	157.560	64.075	170.091	0.08170	0.00821	0.38624	-0.17268	1.4455	1.4493	0.0162	0.4083	0.9974	-1974.3
23.100	157.578	64.151	170.136	0.08215	0.00978	0.38662	-0.17268	1.4467	1.4385	0.0155	0.4089	1.0057	-1978.6
23.150	157.591	64.236	170.180	0.08268	0.01127	0.38705	-0.17268	1.4481	1.4285	0.0147	0.4096	1.0137	-1982.9
23.200	157.598	64.330	170.222	0.08328	0.01270	0.38755	-0.17268	1.4496	1.4195	0.0140	0.4103	1.0213	-1987.2
23.250	157.601	64.433	170.264	0.08395	0.01405	0.38810	-0.17268	1.4514	1.4113	0.0132	0.4112	1.0284	-1991.5
23.300	157.600	64.543	170.304	0.08468	0.01531	0.38870	-0.17268	1.4533	1.4039	0.0123	0.4122	1.0352	-1995.8
23.350	157.594	64.659	170.343	0.08548	0.01649	0.38934	-0.17268	1.4554	1.3974	0.0115	0.4132	1.0415	-2000.2
23.400	157.584	64.781	170.380	0.08633	0.01759	0.39003	-0.17268	1.4576	1.3916	0.0106	0.4143	1.0474	-2004.5
23.450	157.570	64.908	170.415	0.08724	0.01860	0.39075	-0.17268	1.4598	1.3866	0.0097	0.4156	1.0528	-2008.8
23.500	157.552	65.039	170.448	0.08819	0.01952	0.39150	-0.17268	1.4620	1.3822	0.0088	0.4168	1.0578	-2013.1
23.550	157.530	65.174	170.480	0.08919	0.02035	0.39228	-0.17268	1.4643	1.3785	0.0079	0.4182	1.0622	-2017.4
23.600	157.505	65.311	170.509	0.09022	0.02109	0.39308	-0.17268	1.4664	1.3753	0.0070	0.4196	1.0662	-2021.7
23.650	157.477	65.451	170.537	0.09129	0.02173	0.39390	-0.17268	1.4685	1.3727	0.0061	0.4211	1.0698	-2026.0
23.700	157.446	65.592	170.562	0.09239	0.02229	0.39473	-0.17268	1.4704	1.3706	0.0052	0.4227	1.0728	-2030.2
23.750	157.411	65.734	170.585	0.09352	0.02276	0.39558	-0.17268	1.4721	1.3688	0.0043	0.4244	1.0754	-2034.5
23.800	157.374	65.877	170.606	0.09467	0.02315	0.39644	-0.17268	1.4735	1.3675	0.0034	0.4260	1.0775	-2038.8
23.850	157.334	66.020	170.624	0.09583	0.02344	0.39731	-0.17268	1.4746	1.3664	0.0026	0.4278	1.0792	-2043.1
23.900	157.290	66.164	170.640	0.09701	0.02366	0.39818	-0.17268	1.4754	1.3655	0.0018	0.4296	1.0805	-2047.4
23.950	157.245	66.306	170.653	0.09820	0.02380	0.39905	-0.17268	1.4759	1.3649	0.0010	0.4315	1.0813	-2051.7
24.000	157.196	66.449	170.664	0.09939	0.02386	0.39993	-0.17268	1.4759	1.3643	0.0002	0.4334	1.0817	-2055.9
24.050	157.145	66.590	170.671	0.10058	0.02385	0.40081	-0.17268	1.4754	1.3639	-0.0005	0.4354	1.0818	-2060.2
24.100	157.091	66.731	170.677	0.10177	0.02377	0.40170	-0.17268	1.4745	1.3634	-0.0011	0.4375	1.0815	-2064.5
24.150	157.034	66.871	170.679	0.10296	0.02362	0.40258	-0.17268	1.4730	1.3629	-0.0018	0.4396	1.0808	-2068.7
24.200	156.974	67.011	170.679	0.10414	0.02342	0.40347	-0.17268	1.4710	1.3623	-0.0024	0.4418	1.0798	-2073.0
24.250	156.912	67.150	170.676	0.10530	0.02315	0.40436	-0.17268	1.4683	1.3615	-0.0029	0.4440	1.0784	-2077.2
24.300	156.846	67.288	170.670	0.10645	0.02284	0.40526	-0.17268	1.4650	1.3605	-0.0034	0.4463	1.0768	-2081.5
24.350	156.777	67.427	170.661	0.10758	0.02247	0.40617	-0.17268	1.4610	1.3591	-0.0039	0.4487	1.0750	-2085.7
24.400	156.704	67.566	170.650	0.10870	0.02206	0.40708	-0.17268	1.4561	1.3573	-0.0043	0.4512	1.0728	-2089.9
24.450	156.628	67.705	170.635	0.10979	0.02161	0.40801	-0.17268	1.4504	1.3549	-0.0047	0.4539	1.0705	-2094.2
24.500	156.547	67.847	170.617	0.11086	0.02113	0.40896	-0.17268	1.4437	1.3519	-0.0050	0.4566	1.0679	-2098.4
24.550	156.463	67.990	170.597	0.11190	0.02061	0.40993	-0.17268	1.4360	1.3481	-0.0055	0.4597	1.0652	-2102.6
24.600	156.372	68.137	170.572	0.11292	0.02002	0.41093	-0.17268	1.4270	1.3436	-0.0064	0.4633	1.0620	-2106.9
24.650	156.276	68.286	170.544	0.11390	0.01930	0.41196	-0.17268	1.4168	1.3388	-0.0081	0.4679	1.0582	-2111.1
24.700	156.173	68.438	170.510	0.11484	0.01835	0.41302	-0.17268	1.4052	1.3343	-0.0111	0.4738	1.0531	-2115.3
24.750	156.061	68.591	170.469	0.11573	0.01703	0.41410	-0.17268	1.3924	1.3311	-0.0158	0.4814	1.0460	-2119.6
24.800	155.941	68.742	170.420	0.11654	0.01514	0.41519	-0.17268	1.3784	1.3306	-0.0226	0.4910	1.0359	-2123.8
24.850	155.812	68.885	170.360	0.11723	0.01246	0.41627	-0.17268	1.3637	1.3348	-0.0314	0.5026	1.0216	-2128.0
24.900	155.677	69.015	170.289	0.11777	0.00885	0.41729	-0.17268	1.3492	1.3460	-0.0412	0.5150	1.0023	-2132.3
24.950	155.538	69.122	170.205	0.11810	0.00430	0.41819	-0.17268	1.3359	1.3659	-0.0501	0.5264	0.9781	-2136.5
25.000	155.401	69.200	170.112	0.11818	-0.00104	0.41894	-0.17268	1.3250	1.3953	-0.0570	0.5356	0.9496	-2140.8
25.050	155.274	69.241	170.013	0.11799	-0.00691	0.41946	-0.17268	1.3173	1.4343	-0.0611	0.5419	0.9184	-2145.0
25.100	155.161	69.242	169.910	0.11749	-0.01305	0.41974	-0.17268	1.3133	1.4827	-0.0624	0.5450	0.8858	-2149.3
25.150	155.069	69.198	169.808	0.11668	-0.01917	0.41972	-0.17268	1.3135	1.5394	-0.0609	0.5448	0.8533	-2153.6
25.200	155.001	69.108	169.709	0.11558	-0.02498	0.41940	-0.17268	1.3182	1.6028	-0.0563	0.5411	0.8225	-2157.8
25.250	154.962	68.972	169.619	0.11420	-0.03017	0.41876	-0.17268	1.3274	1.6699	-0.0484	0.5336	0.7949	-2162.1
25.300	154.955	68.795	169.540	0.11258	-0.03441	0.41783	-0.17268	1.3412	1.7362	-0.0372	0.5219	0.7725	-2166.4
25.350	154.980	68.582	169.477	0.11078	-0.03740	0.41662	-0.17268	1.3587	1.7958	-0.0234	0.5068	0.7566	-2170.7
25.400	155.038	68.340	169.432	0.10886	-0.03902	0.41517	-0.17268	1.3786	1.8431	-0.0099	0.4909	0.7480	-2175.0
25.450	155.122	68.078	169.404	0.10689	-0.03946	0.41356	-0.17268	1.3989	1.8763	0.0000	0.4774	0.7456	-2179.3
25.500	155.227	67.802	169.388	0.10493	-0.03915	0.41182	-0.17268	1.4182	1.8981	0.0057	0.4672	0.7472	-2183.7
25.550	155.345	67.516	169.383	0.10299	-0.03845	0.40999	-0.17268	1.4355	1.9118	0.0081	0.4599	0.7508	-2188.0
25.600	155.474	67.223	169.384	0.10108	-0.03760	0.40810	-0.17268	1.4499	1.9197	0.0090	0.4541	0.7553	-2192.3
25.650	155.609	66.926	169.391	0.09923	-0.03668	0.40617	-0.17268	1.4609	1.9220	0.0098	0.4488	0.7601	-2196.6
25.700	155.750	66.630	169.403	0.09742	-0.03568	0.40424	-0.17268	1.4687	1.9188	0.0108	0.4437	0.7655	-2200.9
25.750	155.894	66.336	169.421	0.09566	-0.03456	0.40231	-0.17268	1.4735	1.9103	0.0119	0.4389	0.7713	-2205.3
25.800	156.039	66.050	169.443	0.09396	-0.03334	0.40043	-0.17268	1.4757	1.8972	0.0131	0.4345	0.7778	-2209.6
25.850	156.183	65.774	169.468	0.09233	-0.03199	0.39859	-0.17268	1.4757	1.8800	0.0143	0.4305	0.7849	-2213.9
25.900	156.326	65.511	169.498	0.09076	-0.03053	0.39683	-0.17268	1.4740	1.8596	0.0155	0.4268	0.7927	-2218.2
25.950	156.466	65.262	169.530	0.08928	-0.02895	0.39516	-0.17268	1.4712	1.8367	0.0166	0.4235	0.8010	-2222.5
26.000	156.601	65.029	169.566	0.08787	-0.02726	0.39359	-0.17268	1.4677	1.8121	0.0177	0.4206	0.8099	-2226.8
26.050	156.731	64.814	169.604	0.08655	-0.02548	0.39212	-0.17268	1.4638	1.7865	0.0186	0.4179	0.8194	-2231.2
26.100	156.856	64.617	169.645	0.08533	-0.02360	0.39076	-0.17268	1.4598	1.7604	0.0194	0.4156	0.8293	-2235.5
26.150	156.975	64.439	169.687	0.08419	-0.02165	0.38953	-0.17268	1.4560	1.7342	0.0201	0.4135	0.8396	-2239.8

TIME	X VEL	Z VEL	A/C VEL	THETA	THETA DOT	AOA	DE	CL	CL-*	CM	CD	ANFP	ALT
26.200	157.088	64.280	169.731	0.08316	-0.01964	0.38841	-0.17268	1.4524	1.7083	0.0207	0.4117	0.8502	-2244.1
26.250	157.194	64.139	169.776	0.08223	-0.01757	0.38741	-0.17268	1.4492	1.6830	0.0211	0.4101	0.8611	-2248.4
26.300	157.294	64.018	169.823	0.08140	-0.01547	0.38652	-0.17268	1.4464	1.6584	0.0214	0.4088	0.8721	-2252.7
26.350	157.387	63.916	169.871	0.08068	-0.01335	0.38576	-0.17268	1.4440	1.6347	0.0216	0.4076	0.8834	-2257.0
26.400	157.474	63.832	169.919	0.08007	-0.01121	0.38511	-0.17268	1.4420	1.6119	0.0216	0.4067	0.8946	-2261.3
26.450	157.554	63.765	169.968	0.07956	-0.00907	0.38457	-0.17268	1.4405	1.5900	0.0216	0.4059	0.9059	-2265.6
26.500	157.627	63.717	170.018	0.07916	-0.00694	0.38414	-0.17268	1.4392	1.5691	0.0215	0.4052	0.9172	-2269.9
26.550	157.693	63.685	170.068	0.07887	-0.00482	0.38382	-0.17268	1.4383	1.5493	0.0212	0.4048	0.9284	-2274.2
26.600	157.753	63.670	170.118	0.07868	-0.00273	0.38361	-0.17268	1.4378	1.5304	0.0209	0.4045	0.9394	-2278.6
26.650	157.807	63.671	170.168	0.07860	-0.00067	0.38350	-0.17268	1.4375	1.5126	0.0206	0.4043	0.9503	-2282.9
26.700	157.854	63.687	170.217	0.07861	0.00135	0.38348	-0.17268	1.4374	1.4957	0.0201	0.4043	0.9610	-2287.2
26.750	157.895	63.718	170.267	0.07873	0.00332	0.38356	-0.17268	1.4376	1.4798	0.0196	0.4044	0.9715	-2291.5
26.800	157.929	63.763	170.316	0.07894	0.00524	0.38373	-0.17268	1.4381	1.4650	0.0190	0.4047	0.9816	-2295.8
26.850	157.958	63.821	170.364	0.07925	0.00710	0.38398	-0.17268	1.4388	1.4511	0.0184	0.4050	0.9915	-2300.1
26.900	157.980	63.892	170.411	0.07965	0.00889	0.38432	-0.17268	1.4397	1.4382	0.0177	0.4055	1.0011	-2304.4
26.950	157.997	63.975	170.458	0.08014	0.01062	0.38473	-0.17268	1.4409	1.4263	0.0170	0.4061	1.0102	-2308.8
27.000	158.008	64.068	170.503	0.08071	0.01227	0.38522	-0.17268	1.4424	1.4155	0.0162	0.4068	1.0190	-2313.1
27.050	158.014	64.172	170.547	0.08137	0.01384	0.38577	-0.17268	1.4440	1.4056	0.0153	0.4076	1.0274	-2317.4
27.100	158.015	64.284	170.590	0.08210	0.01532	0.38638	-0.17268	1.4459	1.3966	0.0145	0.4085	1.0353	-2321.7
27.150	158.010	64.405	170.632	0.08290	0.01672	0.38704	-0.17268	1.4480	1.3886	0.0136	0.4096	1.0428	-2326.0
27.200	158.001	64.533	170.672	0.08377	0.01802	0.38776	-0.17268	1.4503	1.3816	0.0126	0.4107	1.0498	-2330.3
27.250	157.987	64.668	170.710	0.08470	0.01924	0.38852	-0.17268	1.4528	1.3754	0.0117	0.4119	1.0563	-2334.7
27.300	157.969	64.808	170.746	0.08569	0.02035	0.38932	-0.17268	1.4553	1.3700	0.0107	0.4132	1.0623	-2339.0
27.350	157.947	64.953	170.781	0.08673	0.02137	0.39015	-0.17268	1.4579	1.3654	0.0097	0.4145	1.0677	-2343.3
27.400	157.921	65.101	170.813	0.08782	0.02228	0.39101	-0.17268	1.4606	1.3616	0.0087	0.4160	1.0727	-2347.6
27.450	157.891	65.252	170.843	0.08896	0.02310	0.39190	-0.17268	1.4632	1.3584	0.0077	0.4175	1.0771	-2351.9
27.500	157.858	65.406	170.871	0.09013	0.02381	0.39280	-0.17268	1.4657	1.3558	0.0067	0.4191	1.0810	-2356.2
27.550	157.821	65.561	170.897	0.09134	0.02443	0.39372	-0.17268	1.4680	1.3538	0.0057	0.4208	1.0844	-2360.5
27.600	157.781	65.717	170.920	0.09257	0.02495	0.39466	-0.17268	1.4702	1.3522	0.0047	0.4226	1.0872	-2364.8
27.650	157.738	65.874	170.941	0.09383	0.02537	0.39560	-0.17268	1.4721	1.3510	0.0037	0.4244	1.0896	-2369.1
27.700	157.693	66.031	170.959	0.09511	0.02569	0.39655	-0.17268	1.4736	1.3502	0.0028	0.4263	1.0914	-2373.4
27.750	157.644	66.187	170.975	0.09640	0.02593	0.39750	-0.17268	1.4748	1.3496	0.0019	0.4282	1.0928	-2377.7
27.800	157.592	66.343	170.987	0.09770	0.02607	0.39846	-0.17268	1.4756	1.3492	0.0010	0.4302	1.0937	-2382.0
27.850	157.538	66.497	170.997	0.09900	0.02614	0.39941	-0.17268	1.4759	1.3489	0.0002	0.4323	1.0941	-2386.2
27.900	157.480	66.651	171.004	0.10031	0.02612	0.40037	-0.17268	1.4757	1.3487	-0.0006	0.4344	1.0941	-2390.5
27.950	157.420	66.804	171.008	0.10162	0.02602	0.40133	-0.17268	1.4749	1.3485	-0.0013	0.4366	1.0937	-2394.8
28.000	157.357	66.955	171.010	0.10291	0.02586	0.40229	-0.17268	1.4736	1.3482	-0.0020	0.4389	1.0930	-2399.0
28.050	157.291	67.106	171.008	0.10420	0.02562	0.40325	-0.17268	1.4715	1.3478	-0.0027	0.4412	1.0918	-2403.3
28.100	157.222	67.255	171.003	0.10547	0.02533	0.40422	-0.17268	1.4688	1.3471	-0.0033	0.4436	1.0903	-2407.5
28.150	157.149	67.405	170.995	0.10673	0.02497	0.40519	-0.17268	1.4653	1.3462	-0.0038	0.4461	1.0885	-2411.8
28.200	157.073	67.554	170.984	0.10797	0.02457	0.40616	-0.17268	1.4610	1.3448	-0.0043	0.4487	1.0864	-2416.0
28.250	156.993	67.703	170.970	0.10919	0.02411	0.40715	-0.17268	1.4557	1.3429	-0.0048	0.4514	1.0841	-2420.3
28.300	156.909	67.854	170.952	0.11038	0.02361	0.40815	-0.17268	1.4495	1.3403	-0.0052	0.4543	1.0815	-2424.5
28.350	156.821	68.006	170.931	0.11155	0.02308	0.40918	-0.17268	1.4421	1.3369	-0.0055	0.4573	1.0786	-2428.8
28.400	156.727	68.160	170.907	0.11269	0.02250	0.41022	-0.17268	1.4334	1.3327	-0.0061	0.4607	1.0756	-2433.0
28.450	156.628	68.318	170.879	0.11380	0.02183	0.41130	-0.17268	1.4234	1.3278	-0.0074	0.4649	1.0720	-2437.2
28.500	156.521	68.479	170.846	0.11487	0.02099	0.41242	-0.17268	1.4119	1.3226	-0.0097	0.4703	1.0675	-2441.5
28.550	156.407	68.642	170.806	0.11589	0.01984	0.41356	-0.17268	1.3989	1.3181	-0.0137	0.4774	1.0613	-2445.7
28.600	156.283	68.805	170.758	0.11684	0.01818	0.41473	-0.17268	1.3845	1.3155	-0.0198	0.4866	1.0525	-2449.9
28.650	156.149	68.964	170.700	0.11770	0.01579	0.41589	-0.17268	1.3689	1.3168	-0.0286	0.4983	1.0396	-2454.1
28.700	156.006	69.111	170.629	0.11841	0.01241	0.41702	-0.17268	1.3530	1.3244	-0.0391	0.5117	1.0216	-2458.4
28.750	155.857	69.239	170.545	0.11892	0.00799	0.41806	-0.17268	1.3379	1.3407	-0.0494	0.5247	0.9979	-2462.6
28.800	155.708	69.338	170.449	0.11919	0.00262	0.41895	-0.17268	1.3248	1.3668	-0.0579	0.5358	0.9693	-2466.9
28.850	155.565	69.402	170.344	0.11917	-0.00345	0.41963	-0.17268	1.3149	1.4034	-0.0635	0.5438	0.9369	-2471.1
28.900	155.435	69.424	170.235	0.11884	-0.00993	0.42006	-0.17268	1.3086	1.4501	-0.0663	0.5486	0.9025	-2475.4
28.950	155.325	69.400	170.124	0.11818	-0.01652	0.42020	-0.17268	1.3066	1.5064	-0.0661	0.5501	0.8674	-2479.6
29.000	155.238	69.328	170.015	0.11719	-0.02294	0.42001	-0.17268	1.3093	1.5712	-0.0628	0.5481	0.8333	-2483.9
29.050	155.180	69.206	169.913	0.11589	-0.02886	0.41950	-0.17268	1.3168	1.6422	-0.0563	0.5423	0.8018	-2488.2
29.100	155.154	69.036	169.820	0.11431	-0.03396	0.41865	-0.17268	1.3291	1.7155	-0.0463	0.5322	0.7748	-2492.5
29.150	155.164	68.825	169.743	0.11251	-0.03788	0.41749	-0.17268	1.3461	1.7853	-0.0326	0.5176	0.7540	-2496.8
29.200	155.208	68.578	169.684	0.11055	-0.04033	0.41605	-0.17268	1.3666	1.8443	-0.0172	0.5002	0.7410	-2501.1
29.250	155.285	68.306	169.645	0.10850	-0.04134	0.41440	-0.17268	1.3885	1.8876	-0.0040	0.4839	0.7356	-2505.4
29.300	155.387	68.016	169.621	0.10644	-0.04129	0.41260	-0.17268	1.4099	1.9160	0.0042	0.4713	0.7358	-2509.7
29.350	155.507	67.714	169.610	0.10439	-0.04066	0.41068	-0.17268	1.4293	1.9337	0.0080	0.4624	0.7391	-2514.0
29.400	155.638	67.404	169.607	0.10237	-0.03980	0.40869	-0.17268	1.4457	1.9441	0.0092	0.4558	0.7436	-2518.3
29.450	155.778	67.088	169.610	0.10041	-0.03885	0.40666	-0.17268	1.4585	1.9481	0.0100	0.4501	0.7487	-2522.7
29.500	155.923	66.771	169.619	0.09849	-0.03781	0.40460	-0.17268	1.4675	1.9459	0.0110	0.4446	0.7542	-2527.0
29.550	156.073	66.458	169.633	0.09663	-0.03667	0.40256	-0.17268	1.4731	1.9377	0.0122	0.4395	0.7602	-2531.3
29.600	156.224	66.151	169.652	0.09483	-0.03540	0.40055	-0.17268	1.4756	1.9240	0.0135	0.4348	0.7669	-2535.6
29.650	156.374	65.854	169.675	0.09309	-0.03401	0.39859	-0.17268	1.4757	1.9058	0.0148	0.4305	0.7743	-2539.9
29.700	156.523	65.571	169.703	0.09143	-0.03249	0.39671	-0.17268	1.4739	1.8838	0.0161	0.4266	0.7824	-2544.2
29.750	156.668	65.303	169.733	0.08984	-0.03085	0.39493	-0.17268	1.4708	1.8592	0.0173	0.4231	0.7911	-2548.5
29.800	156.809	65.052	169.767	0.08834	-0.02908	0.39324	-0.17268	1.4668	1.8326	0.0184	0.4199	0.8004	-2552.8
29.850	156.945	64.820	169.804	0.08694	-0.02721	0.39168	-0.17268	1.4625	1.8049	0.0194	0.4171	0.8103	-2557.2
29.900	157.074	64.608	169.843	0.08562	-0.02525	0.39023	-0.17268	1.4582	1.7768	0.0203	0.4147	0.8207	-2561.5

TIME	X VEL	Z VEL	A/C VEL	THETA	THETA DOT	AOA	DE	CL	CL-*	CM	CD	ANFP	ALT
29.950	157.198	64.415	169.884	0.08441	-0.02320	0.38890	-0.17268	1.4540	1.7486	0.0211	0.4125	0.8315	-2565.8
30.000	157.315	64.243	169.926	0.08330	-0.02108	0.38770	-0.17268	1.4501	1.7209	0.0217	0.4106	0.8427	-2570.1
30.050	157.425	64.090	169.971	0.08230	-0.01891	0.38663	-0.17268	1.4467	1.6938	0.0221	0.4089	0.8541	-2574.4
30.100	157.528	63.958	170.016	0.08141	-0.01670	0.38568	-0.17268	1.4438	1.6676	0.0225	0.4075	0.8658	-2578.7
30.150	157.624	63.846	170.063	0.08063	-0.01447	0.38485	-0.17268	1.4413	1.6423	0.0226	0.4063	0.8776	-2583.0
30.200	157.713	63.752	170.111	0.07997	-0.01222	0.38415	-0.17268	1.4392	1.6181	0.0227	0.4053	0.8895	-2587.3
30.250	157.795	63.678	170.159	0.07941	-0.00997	0.38356	-0.17268	1.4376	1.5949	0.0227	0.4044	0.9014	-2591.6
30.300	157.870	63.622	170.208	0.07897	-0.00773	0.38309	-0.17268	1.4364	1.5729	0.0225	0.4038	0.9132	-2595.9
30.350	157.938	63.585	170.257	0.07864	-0.00550	0.38274	-0.17268	1.4355	1.5518	0.0223	0.4033	0.9250	-2600.2
30.400	158.000	63.564	170.307	0.07842	-0.00330	0.38249	-0.17268	1.4349	1.5319	0.0220	0.4029	0.9367	-2604.5
30.450	158.054	63.561	170.356	0.07831	-0.00113	0.38235	-0.17268	1.4345	1.5130	0.0216	0.4027	0.9481	-2608.8
30.500	158.102	63.574	170.405	0.07831	0.00100	0.38232	-0.17268	1.4344	1.4951	0.0211	0.4027	0.9594	-2613.1
30.550	158.144	63.602	170.454	0.07841	0.00307	0.38238	-0.17268	1.4346	1.4783	0.0206	0.4028	0.9704	-2617.4
30.600	158.178	63.646	170.503	0.07861	0.00510	0.38255	-0.17268	1.4350	1.4625	0.0200	0.4030	0.9812	-2621.7
30.650	158.206	63.704	170.550	0.07892	0.00706	0.38280	-0.17268	1.4356	1.4478	0.0194	0.4033	0.9916	-2626.0
30.700	158.228	63.775	170.597	0.07932	0.00896	0.38314	-0.17268	1.4365	1.4341	0.0187	0.4038	1.0017	-2630.3
30.750	158.244	63.859	170.643	0.07981	0.01078	0.38356	-0.17268	1.4376	1.4214	0.0179	0.4044	1.0114	-2634.6
30.800	158.254	63.954	170.688	0.08039	0.01253	0.38406	-0.17268	1.4390	1.4098	0.0171	0.4051	1.0207	-2638.9
30.850	158.258	64.061	170.732	0.08106	0.01420	0.38463	-0.17268	1.4406	1.3992	0.0163	0.4059	1.0296	-2643.3
30.900	158.257	64.178	170.775	0.08181	0.01577	0.38526	-0.17268	1.4425	1.3896	0.0154	0.4069	1.0380	-2647.6
30.950	158.250	64.303	170.816	0.08264	0.01726	0.38596	-0.17268	1.4446	1.3811	0.0144	0.4079	1.0460	-2651.9
31.000	158.239	64.436	170.855	0.08354	0.01866	0.38671	-0.17268	1.4470	1.3735	0.0134	0.4090	1.0535	-2656.2
31.050	158.222	64.577	170.893	0.08450	0.01995	0.38750	-0.17268	1.4495	1.3669	0.0124	0.4103	1.0604	-2660.5
31.100	158.201	64.723	170.929	0.08553	0.02114	0.38834	-0.17268	1.4522	1.3612	0.0114	0.4116	1.0668	-2664.8
31.150	158.176	64.875	170.963	0.08662	0.02223	0.38922	-0.17268	1.4550	1.3564	0.0104	0.4130	1.0727	-2669.1
31.200	158.146	65.030	170.995	0.08775	0.02322	0.39013	-0.17268	1.4579	1.3524	0.0093	0.4145	1.0780	-2673.4
31.250	158.113	65.189	171.024	0.08894	0.02409	0.39106	-0.17268	1.4607	1.3490	0.0082	0.4161	1.0828	-2677.7
31.300	158.076	65.350	171.051	0.09016	0.02487	0.39202	-0.17268	1.4635	1.3464	0.0072	0.4177	1.0870	-2682.0
31.350	158.035	65.513	171.076	0.09142	0.02553	0.39299	-0.17268	1.4662	1.3443	0.0061	0.4195	1.0906	-2686.3
31.400	157.991	65.677	171.099	0.09271	0.02609	0.39397	-0.17268	1.4686	1.3428	0.0051	0.4213	1.0937	-2690.6
31.450	157.944	65.842	171.119	0.09403	0.02655	0.39496	-0.17268	1.4708	1.3417	0.0041	0.4232	1.0963	-2694.9
31.500	157.894	66.006	171.136	0.09536	0.02691	0.39596	-0.17268	1.4727	1.3409	0.0031	0.4251	1.0983	-2699.2
31.550	157.841	66.170	171.150	0.09672	0.02717	0.39696	-0.17268	1.4742	1.3405	0.0021	0.4271	1.0998	-2703.4
31.600	157.786	66.333	171.162	0.09808	0.02734	0.39797	-0.17268	1.4753	1.3402	0.0012	0.4292	1.1008	-2707.7
31.650	157.727	66.496	171.171	0.09945	0.02741	0.39898	-0.17268	1.4758	1.3401	0.0003	0.4313	1.1013	-2712.0
31.700	157.665	66.656	171.176	0.10082	0.02740	0.39998	-0.17268	1.4759	1.3400	-0.0005	0.4335	1.1014	-2716.2
31.750	157.600	66.816	171.179	0.10219	0.02731	0.40099	-0.17268	1.4753	1.3400	-0.0013	0.4358	1.1010	-2720.5
31.800	157.533	66.974	171.179	0.10355	0.02714	0.40199	-0.17268	1.4741	1.3398	-0.0020	0.4382	1.1002	-2724.8
31.850	157.462	67.132	171.175	0.10490	0.02690	0.40300	-0.17268	1.4721	1.3395	-0.0027	0.4406	1.0990	-2729.0
31.900	157.388	67.288	171.169	0.10624	0.02659	0.40401	-0.17268	1.4695	1.3390	-0.0034	0.4431	1.0975	-2733.3
31.950	157.311	67.443	171.159	0.10756	0.02622	0.40502	-0.17268	1.4660	1.3381	-0.0040	0.4457	1.0956	-2737.5
32.000	157.230	67.599	171.146	0.10886	0.02580	0.40604	-0.17268	1.4616	1.3367	-0.0045	0.4484	1.0934	-2741.7
32.050	157.145	67.754	171.129	0.11014	0.02532	0.40707	-0.17268	1.4562	1.3348	-0.0050	0.4512	1.0909	-2746.0
32.100	157.056	67.911	171.109	0.11139	0.02480	0.40812	-0.17268	1.4497	1.3322	-0.0054	0.4542	1.0882	-2750.2
32.150	156.962	68.069	171.086	0.11262	0.02424	0.40919	-0.17268	1.4420	1.3287	-0.0058	0.4573	1.0852	-2754.4
32.200	156.863	68.230	171.059	0.11381	0.02363	0.41028	-0.17268	1.4329	1.3243	-0.0064	0.4609	1.0820	-2758.6
32.250	156.758	68.394	171.028	0.11498	0.02293	0.41141	-0.17268	1.4224	1.3191	-0.0078	0.4653	1.0783	-2762.9
32.300	156.645	68.562	170.992	0.11610	0.02203	0.41257	-0.17268	1.4102	1.3137	-0.0104	0.4711	1.0735	-2767.1
32.350	156.523	68.731	170.949	0.11718	0.02079	0.41376	-0.17268	1.3965	1.3090	-0.0148	0.4788	1.0668	-2771.3
32.400	156.391	68.901	170.896	0.11817	0.01898	0.41498	-0.17268	1.3812	1.3066	-0.0218	0.4890	1.0571	-2775.5
32.450	156.249	69.064	170.832	0.11906	0.01633	0.41619	-0.17268	1.3648	1.3086	-0.0315	0.5018	1.0429	-2779.7
32.500	156.097	69.215	170.754	0.11979	0.01262	0.41736	-0.17268	1.3481	1.3178	-0.0428	0.5159	1.0230	-2784.0
32.550	155.940	69.343	170.663	0.12030	0.00780	0.41842	-0.17268	1.3326	1.3362	-0.0534	0.5293	0.9973	-2788.2
32.600	155.784	69.441	170.560	0.12055	0.00204	0.41932	-0.17268	1.3195	1.3652	-0.0616	0.5401	0.9665	-2792.4
32.650	155.636	69.500	170.449	0.12050	-0.00438	0.41999	-0.17268	1.3097	1.4048	-0.0668	0.5478	0.9323	-2796.7
32.700	155.502	69.515	170.333	0.12011	-0.01117	0.42039	-0.17268	1.3039	1.4551	-0.0691	0.5521	0.8961	-2800.9
32.750	155.390	69.481	170.216	0.11938	-0.01802	0.42047	-0.17268	1.3027	1.5153	-0.0683	0.5531	0.8597	-2805.2
32.800	155.303	69.396	170.103	0.11831	-0.02464	0.42022	-0.17268	1.3062	1.5843	-0.0645	0.5504	0.8245	-2809.4
32.850	155.247	69.260	169.996	0.11692	-0.03070	0.41963	-0.17268	1.3148	1.6594	-0.0572	0.5438	0.7923	-2813.7
32.900	155.225	69.076	169.901	0.11526	-0.03585	0.41869	-0.17268	1.3285	1.7366	-0.0462	0.5327	0.7650	-2818.0
32.950	155.240	68.848	169.822	0.11336	-0.03972	0.41743	-0.17268	1.3470	1.8092	-0.0315	0.5169	0.7445	-2822.3
33.000	155.291	68.585	169.762	0.11131	-0.04202	0.41589	-0.17268	1.3689	1.8693	-0.0152	0.4984	0.7323	-2826.6
33.050	155.375	68.297	169.723	0.10918	-0.04283	0.41414	-0.17268	1.3919	1.9120	-0.0021	0.4817	0.7279	-2830.9
33.100	155.484	67.992	169.700	0.10705	-0.04261	0.41223	-0.17268	1.4138	1.9393	0.0055	0.4693	0.7290	-2835.2
33.150	155.610	67.674	169.689	0.10493	-0.04188	0.41022	-0.17268	1.4334	1.9559	0.0088	0.4607	0.7329	-2839.5
33.200	155.747	67.349	169.685	0.10286	-0.04096	0.40814	-0.17268	1.4496	1.9649	0.0098	0.4542	0.7377	-2843.8
33.250	155.892	67.020	169.688	0.10084	-0.03995	0.40603	-0.17268	1.4617	1.9671	0.0107	0.4484	0.7431	-2848.1
33.300	156.042	66.691	169.697	0.09887	-0.03885	0.40390	-0.17268	1.4698	1.9625	0.0118	0.4428	0.7489	-2852.4
33.350	156.196	66.367	169.711	0.09695	-0.03763	0.40178	-0.17268	1.4744	1.9517	0.0130	0.4377	0.7554	-2856.7
33.400	156.350	66.051	169.730	0.09511	-0.03628	0.39971	-0.17268	1.4759	1.9354	0.0144	0.4329	0.7626	-2861.0
33.450	156.504	65.747	169.753	0.09333	-0.03479	0.39771	-0.17268	1.4751	1.9145	0.0157	0.4287	0.7705	-2865.3
33.500	156.654	65.458	169.780	0.09163	-0.03318	0.39580	-0.17268	1.4724	1.8901	0.0170	0.4248	0.7790	-2869.6
33.550	156.801	65.186	169.811	0.09001	-0.03143	0.39399	-0.17268	1.4687	1.8632	0.0183	0.4213	0.7883	-2873.9
33.600	156.942	64.932	169.844	0.08849	-0.02957	0.39229	-0.17268	1.4643	1.8347	0.0194	0.4182	0.7981	-2878.2
33.650	157.078	64.698	169.880	0.08706	-0.02760	0.39071	-0.17268	1.4597	1.8053	0.0204	0.4155	0.8085	-2882.5

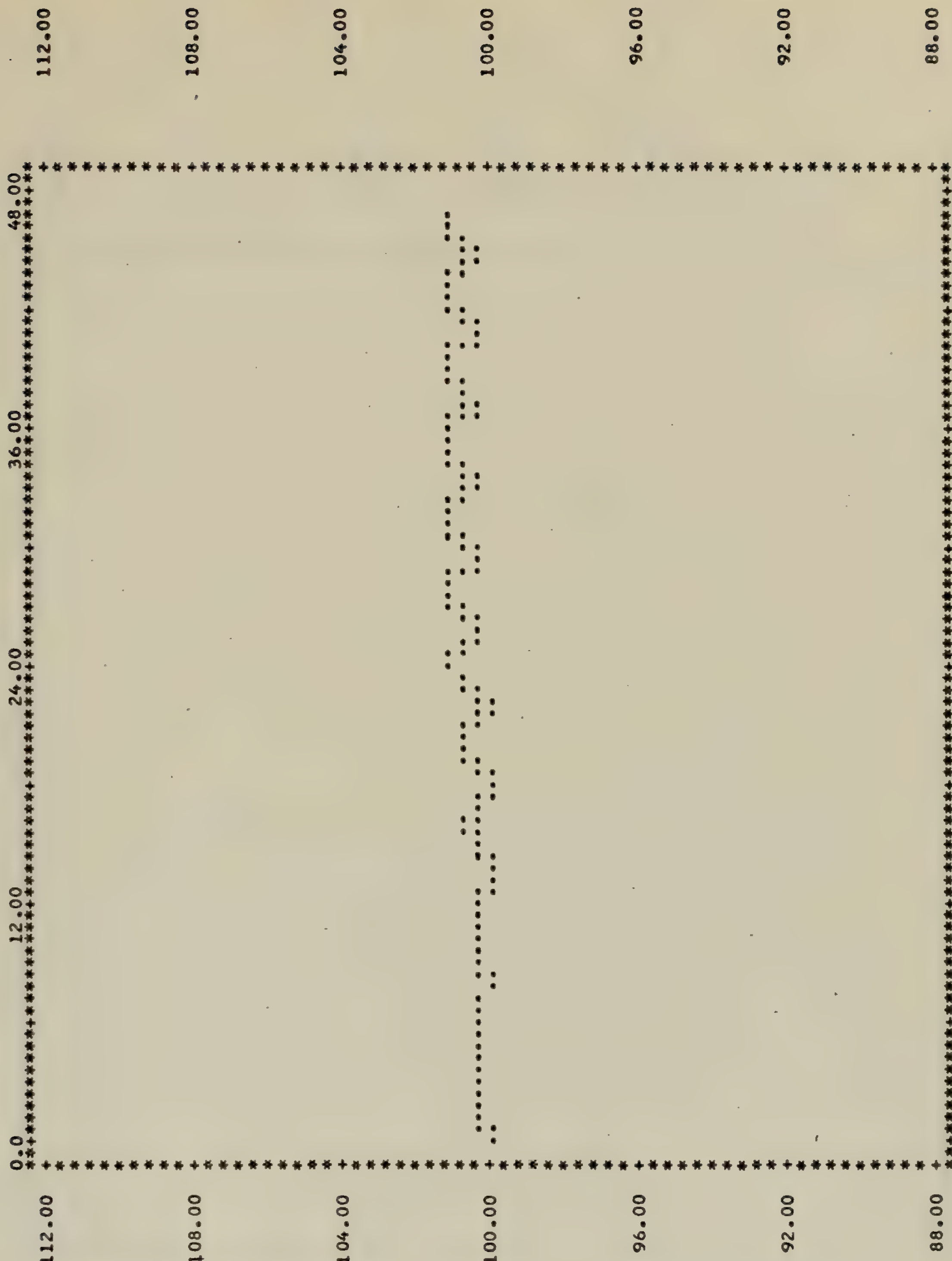
TIME	X VEL	Z VEL	A/C VEL	THETA	THETA DOT	AOA	DE	CL	CL-*	CM	CD	ANFP	ALT
33.700	157.208	64.485	169.919	0.08573	-0.02553	0.38926	-0.17268	1.4551	1.7757	0.0213	0.4131	0.8195	-2886.8
33.750	157.330	64.292	169.960	0.08451	-0.02339	0.38794	-0.17268	1.4509	1.7464	0.0220	0.4110	0.8308	-2891.0
33.800	157.446	64.120	170.002	0.08339	-0.02118	0.38674	-0.17268	1.4471	1.7177	0.0226	0.4091	0.8424	-2895.3
33.850	157.555	63.969	170.046	0.08239	-0.01892	0.38568	-0.17268	1.4438	1.6899	0.0230	0.4075	0.8543	-2899.6
33.900	157.657	63.839	170.091	0.08150	-0.01663	0.38475	-0.17268	1.4410	1.6631	0.0232	0.4061	0.8664	-2903.9
33.950	157.751	63.729	170.138	0.08073	-0.01432	0.38394	-0.17268	1.4387	1.6373	0.0234	0.4050	0.8787	-2908.2
34.000	157.838	63.639	170.185	0.08007	-0.01200	0.38325	-0.17268	1.4368	1.6127	0.0234	0.4040	0.8909	-2912.5
34.050	157.918	63.568	170.233	0.07953	-0.00968	0.38269	-0.17268	1.4354	1.5892	0.0233	0.4032	0.9032	-2916.8
34.100	157.992	63.516	170.281	0.07910	-0.00737	0.38225	-0.17268	1.4343	1.5668	0.0231	0.4026	0.9154	-2921.1
34.150	158.057	63.482	170.329	0.07879	-0.00509	0.38192	-0.17268	1.4335	1.5456	0.0229	0.4021	0.9275	-2925.4
34.200	158.116	63.466	170.378	0.07859	-0.00283	0.38170	-0.17268	1.4330	1.5254	0.0225	0.4018	0.9394	-2929.7
34.250	158.168	63.467	170.427	0.07850	-0.00061	0.38159	-0.17268	1.4327	1.5063	0.0221	0.4017	0.9512	-2934.0
34.300	158.213	63.485	170.475	0.07853	0.00156	0.38159	-0.17268	1.4327	1.4882	0.0216	0.4017	0.9627	-2938.2
34.350	158.252	63.519	170.523	0.07866	0.00368	0.38169	-0.17268	1.4329	1.4713	0.0210	0.4018	0.9739	-2942.5
34.400	158.283	63.568	170.571	0.07890	0.00574	0.38189	-0.17268	1.4334	1.4554	0.0204	0.4021	0.9849	-2946.8
34.450	158.308	63.631	170.618	0.07923	0.00774	0.38218	-0.17268	1.4341	1.4405	0.0197	0.4025	0.9955	-2951.1
34.500	158.327	63.709	170.664	0.07967	0.00967	0.38256	-0.17268	1.4350	1.4268	0.0190	0.4030	1.0058	-2955.4
34.550	158.339	63.799	170.709	0.08020	0.01153	0.38302	-0.17268	1.4362	1.4141	0.0182	0.4037	1.0157	-2959.7
34.600	158.346	63.901	170.753	0.08082	0.01330	0.38357	-0.17268	1.4376	1.4024	0.0173	0.4044	1.0251	-2964.0
34.650	158.346	64.014	170.796	0.08153	0.01499	0.38418	-0.17268	1.4393	1.3918	0.0165	0.4053	1.0341	-2968.3
34.700	158.341	64.137	170.838	0.08232	0.01659	0.38486	-0.17268	1.4413	1.3823	0.0155	0.4063	1.0427	-2972.6
34.750	158.331	64.269	170.877	0.08319	0.01809	0.38560	-0.17268	1.4435	1.3738	0.0145	0.4074	1.0507	-2976.9
34.800	158.315	64.409	170.916	0.08413	0.01950	0.38639	-0.17268	1.4460	1.3664	0.0135	0.4086	1.0582	-2981.2
34.850	158.294	64.556	170.952	0.08513	0.02080	0.38723	-0.17268	1.4486	1.3599	0.0125	0.4099	1.0652	-2985.5
34.900	158.269	64.709	170.987	0.08620	0.02200	0.38812	-0.17268	1.4515	1.3544	0.0114	0.4112	1.0717	-2989.8
34.950	158.240	64.867	171.019	0.08733	0.02309	0.38904	-0.17268	1.4544	1.3498	0.0103	0.4127	1.0775	-2994.1
35.000	158.206	65.029	171.050	0.08851	0.02407	0.38999	-0.17268	1.4574	1.3459	0.0092	0.4143	1.0828	-2998.4
35.050	158.169	65.194	171.078	0.08974	0.02494	0.39096	-0.17268	1.4604	1.3428	0.0081	0.4159	1.0876	-3002.7
35.100	158.128	65.361	171.104	0.09100	0.02570	0.39195	-0.17268	1.4633	1.3404	0.0070	0.4176	1.0917	-3007.0
35.150	158.084	65.530	171.127	0.09230	0.02635	0.39296	-0.17268	1.4661	1.3386	0.0060	0.4194	1.0953	-3011.3
35.200	158.036	65.699	171.148	0.09364	0.02689	0.39399	-0.17268	1.4687	1.3372	0.0049	0.4213	1.0983	-3015.5
35.250	157.985	65.869	171.166	0.09499	0.02733	0.39502	-0.17268	1.4710	1.3363	0.0038	0.4233	1.1007	-3019.8
35.300	157.931	66.038	171.182	0.09637	0.02767	0.39605	-0.17268	1.4729	1.3358	0.0028	0.4253	1.1026	-3024.1
35.350	157.874	66.206	171.194	0.09776	0.02790	0.39709	-0.17268	1.4744	1.3355	0.0018	0.4274	1.1040	-3028.4
35.400	157.814	66.374	171.204	0.09916	0.02804	0.39812	-0.17268	1.4754	1.3354	0.0009	0.4295	1.1048	-3032.6
35.450	157.751	66.540	171.210	0.10056	0.02808	0.39916	-0.17268	1.4759	1.3354	0.0000	0.4317	1.1052	-3036.9
35.500	157.685	66.705	171.214	0.10196	0.02804	0.40020	-0.17268	1.4758	1.3355	-0.0008	0.4340	1.1051	-3041.1
35.550	157.616	66.869	171.214	0.10336	0.02791	0.40124	-0.17268	1.4750	1.3355	-0.0016	0.4364	1.1045	-3045.4
35.600	157.545	67.031	171.212	0.10475	0.02771	0.40227	-0.17268	1.4736	1.3353	-0.0024	0.4388	1.1035	-3049.6
35.65C	157.470	67.192	171.206	0.10613	0.02744	0.40331	-0.17268	1.4714	1.3350	-0.0031	0.4414	1.1022	-3053.9
35.700	157.391	67.353	171.197	0.10749	0.02709	0.40435	-0.17268	1.4684	1.3344	-0.0037	0.4440	1.1004	-3058.1
35.750	157.309	67.512	171.185	0.10884	0.02669	0.40540	-0.17268	1.4645	1.3333	-0.0043	0.4467	1.0984	-3062.3
35.800	157.224	67.672	171.169	0.11016	0.02623	0.40645	-0.17268	1.4596	1.3318	-0.0048	0.4495	1.0960	-3066.6
35.850	157.134	67.832	171.150	0.11146	0.02572	0.40752	-0.17268	1.4536	1.3295	-0.0053	0.4525	1.0933	-3070.8
35.900	157.039	67.993	171.127	0.11273	0.02517	0.40860	-0.17268	1.4464	1.3265	-0.0057	0.4556	1.0904	-3075.0
35.950	156.940	68.157	171.101	0.11398	0.02457	0.40971	-0.17268	1.4378	1.3224	-0.0062	0.4589	1.0873	-3079.2
36.000	156.834	68.323	171.070	0.11519	0.02391	0.41085	-0.17268	1.4277	1.3174	-0.0071	0.4630	1.0838	-3083.4
36.050	156.722	68.494	171.035	0.11637	0.02311	0.41202	-0.17268	1.4161	1.3118	-0.0091	0.4682	1.0795	-3087.6
36.100	156.601	68.667	170.994	0.11750	0.02203	0.41324	-0.17268	1.4027	1.3064	-0.0128	0.4752	1.0737	-3091.8
36.150	156.470	68.841	170.945	0.11856	0.02048	0.41448	-0.17268	1.3877	1.3026	-0.0187	0.4845	1.0653	-3096.0
36.200	156.328	69.013	170.884	0.11953	0.01818	0.41573	-0.17268	1.3712	1.3021	-0.0277	0.4966	1.0530	-3100.2
36.250	156.176	69.175	170.810	0.12036	0.01486	0.41696	-0.17268	1.3539	1.3079	-0.0390	0.5109	1.0352	-3104.5
36.300	156.016	69.318	170.722	0.12100	0.01038	0.41810	-0.17268	1.3372	1.3223	-0.0504	0.5253	1.0113	-3108.7
36.350	155.854	69.433	170.620	0.12138	0.00484	0.41910	-0.17268	1.3225	1.3472	-0.0600	0.5376	0.9817	-3112.9
36.400	155.696	69.511	170.509	0.12147	-0.00150	0.41990	-0.17268	1.3110	1.3831	-0.0667	0.5468	0.9478	-3117.1
36.450	155.552	69.547	170.391	0.12122	-0.00835	0.42044	-0.17268	1.3032	1.4299	-0.0703	0.5527	0.9114	-3121.4
36.500	155.426	69.534	170.271	0.12063	-0.01538	0.42067	-0.17268	1.2998	1.4874	-0.0708	0.5551	0.8739	-3125.6
36.550	155.325	69.470	170.153	0.11969	-0.02231	0.42057	-0.17268	1.3013	1.5545	-0.0683	0.5541	0.8371	-3129.8
36.600	155.253	69.353	170.039	0.11841	-0.02882	0.42012	-0.17268	1.3078	1.6296	-0.0625	0.5492	0.8025	-3134.1
36.650	155.214	69.185	169.935	0.11682	-0.03457	0.41931	-0.17268	1.3195	1.7092	-0.0531	0.5401	0.7720	-3138.4
36.700	155.212	68.970	169.846	0.11497	-0.03918	0.41815	-0.17268	1.3364	1.7877	-0.0396	0.5260	0.7475	-3142.6
36.750	155.248	68.714	169.775	0.11292	-0.04229	0.41669	-0.17268	1.3576	1.8570	-0.0230	0.5078	0.7311	-3146.9
36.800	155.320	68.428	169.725	0.11077	-0.04375	0.41498	-0.17268	1.3812	1.9096	-0.0073	0.4890	0.7233	-3151.2
36.850	155.422	68.121	169.695	0.10857	-0.04391	0.41308	-0.17268	1.4044	1.9441	0.0031	0.4742	0.7224	-3155.5
36.900	155.544	67.800	169.678	0.10639	-0.04332	0.41106	-0.17268	1.4257	1.9652	0.0081	0.4638	0.7255	-3159.8
36.950	155.680	67.469	169.671	0.10424	-0.04242	0.40895	-0.17268	1.4438	1.9772	0.0097	0.4566	0.7302	-3164.1
37.000	155.825	67.133	169.671	0.10215	-0.04142	0.40679	-0.17268	1.4578	1.9820	0.0106	0.4504	0.7355	-3168.4
37.050	155.976	66.795	169.677	0.10010	-0.04033	0.40461	-0.17268	1.4675	1.9796	0.0116	0.4446	0.7413	-3172.7
37.100	156.131	66.461	169.688	0.09812	-0.03912	0.40244	-0.17268	1.4733	1.9704	0.0129	0.4392	0.7477	-3177.0
37.150	156.288	66.134	169.705	0.09619	-0.03779	0.40030	-0.17268	1.4757	1.9552	0.0142	0.4343	0.7548	-3181.3
37.200	156.445	65.818	169.726	0.09434	-0.03632	0.39823	-0.17268	1.4755	1.9348	0.0156	0.4297	0.7626	-3185.6
37.250	156.599	65.516	169.752	0.09256	-0.03471	0.39624	-0.17268	1.4732	1.9104	0.0170	0.4257	0.7711	-3189.9
37.300	156.749	65.231	169.781	0.09087	-0.03296	0.39435	-0.17268	1.4695	1.8832	0.0183	0.4220	0.7804	-3194.2
37.350	156.895	64.965	169.813	0.08927	-0.03110	0.39257	-0.17268	1.4651	1.8540	0.0195	0.4187	0.7902	-3198.4
37.400	157.035	64.719	169.848	0.08776	-0.02911	0.39092	-0.17268	1.4603	1.8238	0.0206	0.4158	0.8007	-3202.7

TIME	X VEL	Z VEL	A/C VEL	THETA	THETA DOT	AOA	DE	CL	CL-*	CM	CD	ANFP	ALT
37.450	157.168	64.494	169.886	0.08636	-0.02703	0.38940	-0.17268	1.4556	1.7932	0.0215	0.4133	0.8117	-3207.0
37.500	157.295	64.290	169.926	0.08506	-0.02486	0.38800	-0.17268	1.4511	1.7629	0.0223	0.4111	0.8232	-3211.3
37.550	157.415	64.107	169.968	0.08388	-0.02263	0.38674	-0.17268	1.4471	1.7331	0.0229	0.4091	0.8350	-3215.6
37.600	157.527	63.945	170.011	0.08280	-0.02033	0.38561	-0.17268	1.4436	1.7042	0.0234	0.4074	0.8471	-3219.9
37.650	157.632	63.805	170.056	0.08184	-0.01800	0.38461	-0.17268	1.4406	1.6764	0.0237	0.4059	0.8593	-3224.1
37.700	157.730	63.686	170.102	0.08100	-0.01565	0.38375	-0.17268	1.4381	1.6496	0.0238	0.4047	0.8718	-3228.4
37.750	157.821	63.586	170.149	0.08028	-0.01328	0.38300	-0.17268	1.4362	1.6241	0.0239	0.4036	0.8843	-3232.7
37.800	157.904	63.507	170.197	0.07967	-0.01091	0.38239	-0.17268	1.4346	1.5997	0.0238	0.4028	0.8968	-3237.0
37.850	157.981	63.447	170.245	0.07919	-0.00856	0.38189	-0.17268	1.4334	1.5765	0.0237	0.4021	0.9093	-3241.3
37.900	158.050	63.405	170.294	0.07882	-0.00622	0.38152	-0.17268	1.4325	1.5543	0.0234	0.4016	0.9216	-3245.6
37.950	158.111	63.383	170.342	0.07856	-0.00391	0.38126	-0.17268	1.4319	1.5334	0.0231	0.4012	0.9339	-3249.8
38.000	158.166	63.377	170.391	0.07843	-0.00163	0.38111	-0.17268	1.4316	1.5135	0.0227	0.4010	0.9459	-3254.1
38.050	158.214	63.389	170.440	0.07840	0.00060	0.38107	-0.17268	1.4315	1.4947	0.0222	0.4010	0.9577	-3258.4
38.100	158.255	63.418	170.489	0.07849	0.00278	0.38114	-0.17268	1.4317	1.4770	0.0216	0.4011	0.9693	-3262.7
38.150	158.289	63.462	170.537	0.07868	0.00491	0.38131	-0.17268	1.4321	1.4604	0.0210	0.4013	0.9806	-3267.0
38.200	158.316	63.522	170.584	0.07898	0.00697	0.38157	-0.17268	1.4327	1.4449	0.0204	0.4016	0.9915	-3271.3
38.250	158.337	63.596	170.631	0.07937	0.00897	0.38193	-0.17268	1.4335	1.4304	0.0196	0.4021	1.0021	-3275.6
38.300	158.351	63.683	170.677	0.07987	0.01088	0.38237	-0.17268	1.4346	1.4171	0.0188	0.4027	1.0123	-3279.9
38.350	158.359	63.783	170.721	0.08046	0.01272	0.38290	-0.17268	1.4359	1.4048	0.0180	0.4035	1.0221	-3284.2
38.400	158.361	63.894	170.765	0.08114	0.01448	0.38350	-0.17268	1.4375	1.3936	0.0171	0.4043	1.0315	-3288.5
38.450	158.357	64.017	170.807	0.08191	0.01614	0.38417	-0.17268	1.4393	1.3835	0.0162	0.4053	1.0404	-3292.8
38.500	158.348	64.148	170.848	0.08275	0.01771	0.38490	-0.17268	1.4414	1.3744	0.0152	0.4064	1.0488	-3297.1
38.550	158.333	64.289	170.887	0.08368	0.01918	0.38570	-0.17268	1.4438	1.3664	0.0142	0.4075	1.0566	-3301.3
38.600	158.313	64.437	170.924	0.08467	0.02055	0.38654	-0.17268	1.4464	1.3595	0.0132	0.4088	1.0640	-3305.6
38.650	158.289	64.591	170.960	0.08573	0.02182	0.38743	-0.17268	1.4493	1.3535	0.0121	0.4102	1.0708	-3309.9
38.700	158.260	64.751	170.994	0.08685	0.02297	0.38836	-0.17268	1.4523	1.3485	0.0110	0.4116	1.0770	-3314.2
38.750	158.226	64.915	171.025	0.08803	0.02401	0.38933	-0.17268	1.4553	1.3443	0.0099	0.4132	1.0826	-3318.5
38.800	158.189	65.083	171.054	0.08925	0.02494	0.39031	-0.17268	1.4584	1.3409	0.0087	0.4148	1.0876	-3322.8
38.850	158.148	65.253	171.081	0.09052	0.02576	0.39133	-0.17268	1.4615	1.3383	0.0076	0.4165	1.0921	-3327.1
38.900	158.104	65.425	171.106	0.09182	0.02647	0.39235	-0.17268	1.4645	1.3363	0.0065	0.4183	1.0959	-3331.4
38.950	158.056	65.598	171.128	0.09316	0.02706	0.39339	-0.17268	1.4672	1.3348	0.0054	0.4202	1.0992	-3335.6
39.000	158.004	65.771	171.147	0.09453	0.02755	0.39444	-0.17268	1.4697	1.3338	0.0043	0.4222	1.1019	-3339.9
39.050	157.950	65.944	171.163	0.09592	0.02793	0.39550	-0.17268	1.4719	1.3332	0.0033	0.4242	1.1040	-3344.2
39.100	157.893	66.117	171.177	0.09732	0.02821	0.39656	-0.17268	1.4737	1.3329	0.0022	0.4263	1.1056	-3348.4
39.150	157.832	66.288	171.188	0.09874	0.02838	0.39762	-0.17268	1.4750	1.3328	0.0013	0.4285	1.1067	-3352.7
39.200	157.769	66.458	171.195	0.10016	0.02846	0.39868	-0.17268	1.4757	1.3328	0.0003	0.4307	1.1072	-3357.0
39.250	157.703	66.627	171.200	0.10158	0.02845	0.39974	-0.17268	1.4759	1.3330	-0.0006	0.4330	1.1072	-3361.2
39.300	157.634	66.795	171.202	0.10300	0.02835	0.40080	-0.17268	1.4754	1.3330	-0.0014	0.4354	1.1068	-3365.5
39.350	157.562	66.960	171.200	0.10441	0.02817	0.40185	-0.17268	1.4743	1.3330	-0.0022	0.4378	1.1060	-3369.7
39.400	157.487	67.125	171.195	0.10582	0.02791	0.40291	-0.17268	1.4723	1.3328	-0.0029	0.4404	1.1047	-3373.9
39.450	157.408	67.289	171.187	0.10720	0.02759	0.40397	-0.17268	1.4696	1.3323	-0.0036	0.4430	1.1031	-3378.2
39.500	157.326	67.451	171.176	0.10857	0.02719	0.40503	-0.17268	1.4659	1.3314	-0.0042	0.4457	1.1011	-3382.4
39.550	157.240	67.614	171.161	0.10992	0.02674	0.40610	-0.17268	1.4613	1.3300	-0.0048	0.4486	1.0987	-3386.6
39.600	157.150	67.777	171.143	0.11125	0.02624	0.40718	-0.17268	1.4556	1.3279	-0.0053	0.4515	1.0961	-3390.8
39.650	157.055	67.940	171.121	0.11255	0.02569	0.40828	-0.17268	1.4486	1.3251	-0.0057	0.4546	1.0932	-3395.1
39.700	156.956	68.106	171.095	0.11382	0.02510	0.40940	-0.17268	1.4403	1.3212	-0.0061	0.4580	1.0901	-3399.3
39.750	156.851	68.275	171.066	0.11505	0.02446	0.41055	-0.17268	1.4305	1.3164	-0.0069	0.4619	1.0867	-3403.5
39.800	156.738	68.448	171.032	0.11626	0.02369	0.41174	-0.17268	1.4190	1.3107	-0.0086	0.4668	1.0826	-3407.7
39.850	156.618	68.624	170.992	0.11742	0.02268	0.41296	-0.17268	1.4058	1.3051	-0.0119	0.4734	1.0772	-3411.9
39.900	156.488	68.801	170.944	0.11852	0.02124	0.41422	-0.17268	1.3909	1.3006	-0.0174	0.4823	1.0694	-3416.1
39.950	156.347	68.977	170.886	0.11953	0.01910	0.41550	-0.17268	1.3744	1.2990	-0.0258	0.4941	1.0580	-3420.3
40.000	156.194	69.145	170.815	0.12041	0.01597	0.41675	-0.17268	1.3568	1.3032	-0.0371	0.5084	1.0412	-3424.5
40.050	156.033	69.295	170.728	0.12111	0.01166	0.41794	-0.17268	1.3396	1.3157	-0.0490	0.5233	1.0181	-3428.7
40.100	155.868	69.419	170.628	0.12156	0.00623	0.41900	-0.17268	1.3241	1.3386	-0.0592	0.5364	0.9891	-3432.9
40.150	155.707	69.508	170.517	0.12172	-0.00007	0.41986	-0.17268	1.3115	1.3726	-0.0666	0.5464	0.9555	-3437.2
40.200	155.557	69.555	170.399	0.12154	-0.00694	0.42047	-0.17268	1.3028	1.4177	-0.0709	0.5530	0.9189	-3441.4
40.250	155.425	69.553	170.278	0.12102	-0.01407	0.42078	-0.17268	1.2983	1.4738	-0.0721	0.5562	0.8809	-3445.6
40.300	155.316	69.500	170.157	0.12014	-0.02116	0.42075	-0.17268	1.2987	1.5401	-0.0702	0.5560	0.8433	-3449.9
40.350	155.237	69.393	170.041	0.11891	-0.02789	0.42037	-0.17268	1.3042	1.6151	-0.0651	0.5520	0.8075	-3454.1
40.400	155.190	69.234	169.933	0.11736	-0.03394	0.41962	-0.17268	1.3149	1.6958	-0.0564	0.5437	0.7754	-3458.4
40.450	155.180	69.025	169.839	0.11553	-0.03893	0.41853	-0.17268	1.3309	1.7770	-0.0438	0.5307	0.7490	-3462.7
40.500	155.208	68.773	169.762	0.11349	-0.04246	0.41710	-0.17268	1.3517	1.8510	-0.0274	0.5128	0.7302	-3466.9
40.550	155.274	68.488	169.708	0.11132	-0.04430	0.41541	-0.17268	1.3754	1.9092	-0.0105	0.4933	0.7204	-3471.2
40.600	155.372	68.180	169.673	0.10909	-0.04470	0.41352	-0.17268	1.3994	1.9482	0.0014	0.4771	0.7183	-3475.5
40.650	155.493	67.857	169.654	0.10686	-0.04421	0.41148	-0.17268	1.4216	1.9721	0.0076	0.4657	0.7208	-3479.8
40.700	155.629	67.522	169.646	0.10467	-0.04333	0.40936	-0.17268	1.4406	1.9859	0.0097	0.4578	0.7255	-3484.1
40.750	155.775	67.182	169.644	0.10253	-0.04233	0.40717	-0.17268	1.4556	1.9920	0.0106	0.4515	0.7307	-3488.4
40.800	155.928	66.839	169.649	0.10044	-0.04124	0.40496	-0.17268	1.4662	1.9907	0.0116	0.4455	0.7365	-3492.7
40.850	156.085	66.498	169.660	0.09841	-0.04004	0.40275	-0.17268	1.4727	1.9823	0.0129	0.4400	0.7429	-3497.0
40.900	156.244	66.165	169.676	0.09644	-0.03870	0.40057	-0.17268	1.4756	1.9675	0.0142	0.4349	0.7500	-3501.3
40.950	156.403	65.842	169.697	0.09454	-0.03723	0.39846	-0.17268	1.4756	1.9472	0.0156	0.4302	0.7578	-3505.6
41.000	156.560	65.534	169.722	0.09272	-0.03562	0.39642	-0.17268	1.4735	1.9227	0.0170	0.4260	0.7663	-3509.9
41.050	156.713	65.242	169.751	0.09098	-0.03387	0.39449	-0.17268	1.4698	1.8951	0.0184	0.4223	0.7756	-3514.2
41.100	156.862	64.969	169.784	0.08937	-0.03199	0.39267	-0.17268	1.4653	1.8654	0.0196	0.4189	0.7855	-3518.4
41.150	157.004	64.716	169.819	0.08778	-0.03000	0.39097	-0.17268	1.4605	1.8346	0.0207	0.4159	0.7961	-3522.7

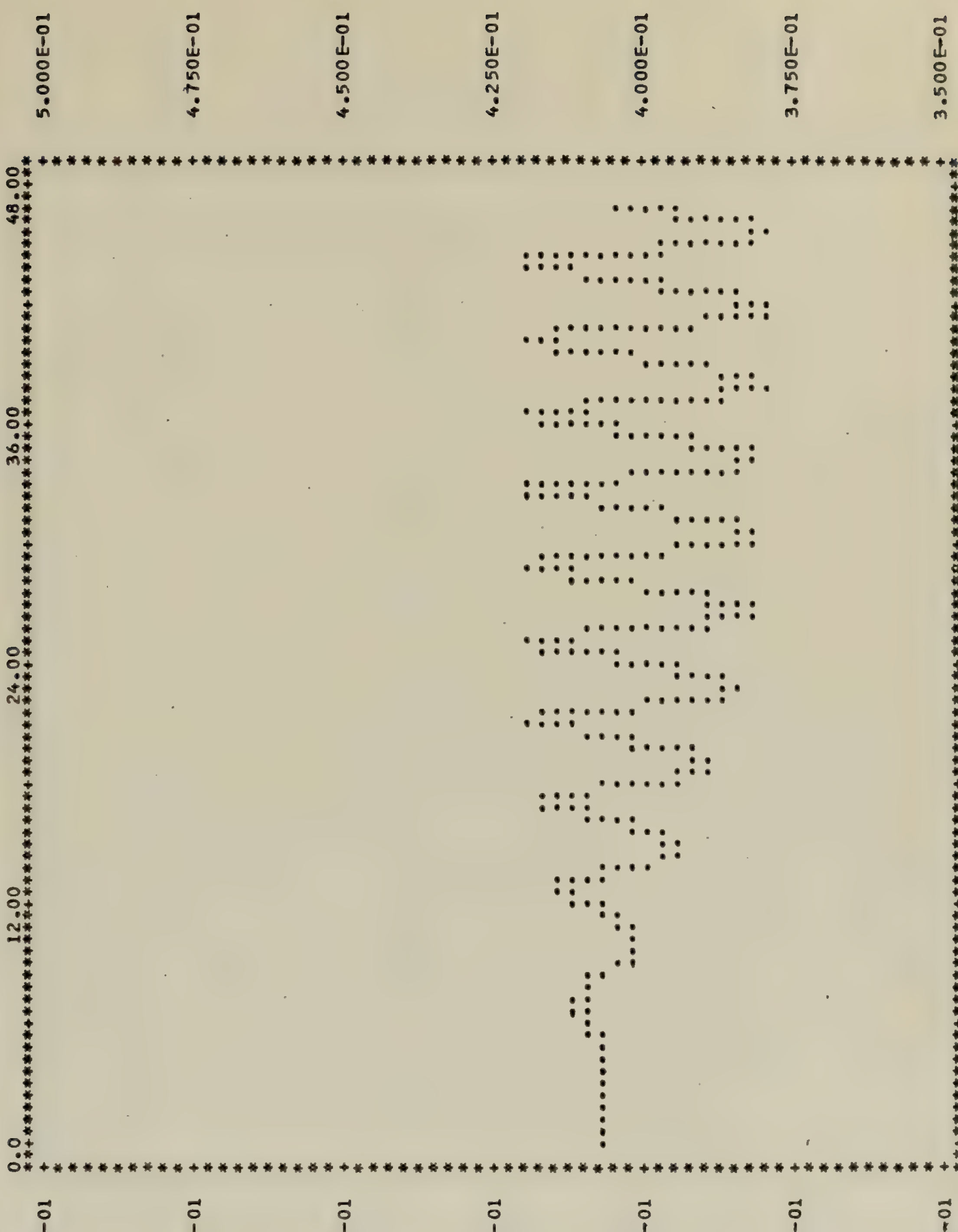
TIME	X VEL	Z VEL	A/C VEL	THETA	THETA DOT	AOA	DE	CL	CL-*	CM	CD	ANFP	ALT
41.200	157.141	64.484	169.857	0.08633	-0.02790	0.38941	-0.17268	1.4556	1.8034	0.0217	0.4133	0.8071	-3527.0
41.250	157.270	64.274	169.897	0.08499	-0.02571	0.38797	-0.17268	1.4510	1.7724	0.0225	0.4110	0.8187	-3531.3
41.300	157.392	64.086	169.939	0.08376	-0.02345	0.38667	-0.17268	1.4469	1.7419	0.0231	0.4090	0.8306	-3535.6
41.350	157.507	63.919	169.983	0.08265	-0.02114	0.38551	-0.17268	1.4432	1.7124	0.0236	0.4072	0.8428	-3539.9
41.400	157.615	63.773	170.028	0.08165	-0.01878	0.38448	-0.17268	1.4402	1.6839	0.0240	0.4057	0.8553	-3544.1
41.450	157.716	63.648	170.075	0.08077	-0.01639	0.38358	-0.17268	1.4377	1.6566	0.0242	0.4044	0.8678	-3548.4
41.500	157.809	63.545	170.122	0.08001	-0.01400	0.38280	-0.17268	1.4356	1.6305	0.0242	0.4033	0.8805	-3552.7
41.550	157.895	63.461	170.170	0.07937	-0.01160	0.38216	-0.17268	1.4340	1.6056	0.0242	0.4025	0.8932	-3557.0
41.600	157.973	63.397	170.219	0.07885	-0.00921	0.38164	-0.17268	1.4328	1.5818	0.0240	0.4017	0.9058	-3561.3
41.650	158.044	63.352	170.269	0.07845	-0.00683	0.38124	-0.17268	1.4319	1.5592	0.0238	0.4012	0.9184	-3565.6
41.700	158.108	63.325	170.318	0.07817	-0.00449	0.38095	-0.17268	1.4313	1.5377	0.0234	0.4008	0.9308	-3569.8
41.750	158.165	63.317	170.368	0.07800	-0.00217	0.38078	-0.17268	1.4309	1.5174	0.0230	0.4006	0.9430	-3574.1
41.800	158.215	63.326	170.417	0.07795	0.00009	0.38073	-0.17268	1.4308	1.4982	0.0226	0.4005	0.9550	-3578.4
41.850	158.257	63.352	170.467	0.07801	0.00231	0.38078	-0.17268	1.4309	1.4801	0.0220	0.4006	0.9668	-3582.7
41.900	158.293	63.394	170.515	0.07818	0.00448	0.38093	-0.17268	1.4312	1.4630	0.0214	0.4008	0.9782	-3587.0
41.950	158.322	63.452	170.564	0.07846	0.00658	0.38118	-0.17268	1.4318	1.4471	0.0207	0.4011	0.9894	-3591.3
42.000	158.344	63.524	170.611	0.07884	0.00861	0.38152	-0.17268	1.4325	1.4323	0.0200	0.4016	1.0002	-3595.6
42.050	158.360	63.611	170.658	0.07932	0.01056	0.38196	-0.17268	1.4336	1.4185	0.0192	0.4022	1.0106	-3599.9
42.100	158.369	63.710	170.704	0.07989	0.01244	0.38248	-0.17268	1.4348	1.4059	0.0184	0.4029	1.0206	-3604.2
42.150	158.372	63.821	170.748	0.08056	0.01424	0.38307	-0.17268	1.4363	1.3943	0.0175	0.4037	1.0301	-3608.5
42.200	158.370	63.943	170.791	0.08131	0.01594	0.38374	-0.17268	1.4381	1.3838	0.0166	0.4047	1.0392	-3612.8
42.250	158.361	64.075	170.833	0.08215	0.01755	0.38448	-0.17268	1.4402	1.3744	0.0156	0.4057	1.0478	-3617.1
42.300	158.348	64.216	170.873	0.08307	0.01906	0.38527	-0.17268	1.4425	1.3661	0.0146	0.4069	1.0559	-3621.4
42.350	158.329	64.365	170.912	0.08406	0.02047	0.38612	-0.17268	1.4451	1.3589	0.0135	0.4082	1.0635	-3625.7
42.400	158.305	64.521	170.948	0.08511	0.02177	0.38702	-0.17268	1.4479	1.3527	0.0125	0.4095	1.0704	-3630.0
42.450	158.276	64.682	170.983	0.08623	0.02296	0.38795	-0.17268	1.4509	1.3474	0.0113	0.4110	1.0768	-3634.2
42.500	158.244	64.848	171.016	0.08741	0.02404	0.38893	-0.17268	1.4541	1.3430	0.0102	0.4125	1.0827	-3638.5
42.550	158.207	65.018	171.046	0.08863	0.02501	0.38993	-0.17268	1.4572	1.3395	0.0091	0.4142	1.0879	-3642.8
42.600	158.166	65.190	171.074	0.08991	0.02586	0.39095	-0.17268	1.4604	1.3367	0.0079	0.4159	1.0925	-3647.1
42.650	158.122	65.365	171.099	0.09122	0.02660	0.39199	-0.17268	1.4634	1.3346	0.0068	0.4177	1.0966	-3651.4
42.700	158.074	65.540	171.122	0.09256	0.02722	0.39304	-0.17268	1.4663	1.3330	0.0057	0.4196	1.1000	-3655.7
42.750	158.023	65.716	171.143	0.09394	0.02774	0.39411	-0.17268	1.4690	1.3320	0.0046	0.4215	1.1028	-3660.0
42.800	157.969	65.892	171.160	0.09533	0.02814	0.39518	-0.17268	1.4713	1.3314	0.0035	0.4236	1.1051	-3664.2
42.850	157.912	66.067	171.175	0.09675	0.02844	0.39625	-0.17268	1.4732	1.3310	0.0025	0.4257	1.1068	-3668.5
42.900	157.851	66.241	171.187	0.09818	0.02864	0.39732	-0.17268	1.4747	1.3310	0.0015	0.4278	1.1080	-3672.8
42.950	157.788	66.414	171.196	0.09961	0.02874	0.39840	-0.17268	1.4756	1.3310	0.0005	0.4301	1.1086	-3677.0
43.000	157.722	66.585	171.201	0.10105	0.02874	0.39947	-0.17268	1.4759	1.3312	-0.0004	0.4324	1.1087	-3681.3
43.050	157.653	66.755	171.204	0.10248	0.02866	0.40054	-0.17268	1.4756	1.3313	-0.0013	0.4348	1.1084	-3685.5
43.100	157.581	66.924	171.204	0.10391	0.02849	0.40161	-0.17268	1.4746	1.3313	-0.0021	0.4373	1.1076	-3689.8
43.150	157.506	67.091	171.200	0.10533	0.02824	0.40268	-0.17268	1.4728	1.3312	-0.0028	0.4398	1.1064	-3694.0
43.200	157.428	67.257	171.193	0.10674	0.02792	0.40375	-0.17268	1.4702	1.3308	-0.0035	0.4425	1.1048	-3698.3
43.250	157.346	67.421	171.182	0.10812	0.02754	0.40483	-0.17268	1.4667	1.3300	-0.0041	0.4452	1.1028	-3702.5
43.300	157.260	67.586	171.168	0.10949	0.02709	0.40591	-0.17268	1.4622	1.3286	-0.0047	0.4480	1.1005	-3706.7
43.350	157.170	67.751	171.151	0.11083	0.02659	0.40700	-0.17268	1.4566	1.3267	-0.0052	0.4510	1.0979	-3710.9
43.400	157.076	67.916	171.130	0.11215	0.02605	0.40810	-0.17268	1.4498	1.3240	-0.0057	0.4541	1.0951	-3715.1
43.450	156.976	68.084	171.105	0.11344	0.02546	0.40923	-0.17268	1.4416	1.3202	-0.0061	0.4574	1.0919	-3719.4
43.500	156.871	68.254	171.077	0.11469	0.02481	0.41039	-0.17268	1.4319	1.3154	-0.0068	0.4613	1.0885	-3723.6
43.550	156.759	68.428	171.044	0.11592	0.02406	0.41159	-0.17268	1.4206	1.3098	-0.0084	0.4661	1.0845	-3727.8
43.600	156.639	68.606	171.005	0.11710	0.02309	0.41282	-0.17268	1.4075	1.3041	-0.0114	0.4726	1.0793	-3732.0
43.650	156.510	68.785	170.958	0.11822	0.02170	0.41408	-0.17268	1.3926	1.2992	-0.0167	0.4812	1.0719	-3736.2
43.700	156.369	68.964	170.901	0.11925	0.01964	0.41537	-0.17268	1.3760	1.2972	-0.0249	0.4928	1.0608	-3740.4
43.750	156.217	69.135	170.831	0.12016	0.01660	0.41664	-0.17268	1.3584	1.3005	-0.0361	0.5071	1.0445	-3744.6
43.800	156.055	69.289	170.746	0.12089	0.01238	0.41786	-0.17268	1.3408	1.3120	-0.0482	0.5222	1.0220	-3748.8
43.850	155.889	69.418	170.647	0.12138	0.00702	0.41894	-0.17268	1.3249	1.3339	-0.0588	0.5357	0.9933	-3753.1
43.900	155.726	69.513	170.537	0.12158	0.00074	0.41984	-0.17268	1.3119	1.3669	-0.0666	0.5461	0.9597	-3757.3
43.950	155.574	69.565	170.419	0.12145	-0.00615	0.42048	-0.17268	1.3025	1.4111	-0.0712	0.5531	0.9230	-3761.5
44.000	155.439	69.570	170.297	0.12096	-0.01333	0.42083	-0.17268	1.2975	1.4665	-0.0727	0.5568	0.8848	-3765.8
44.050	155.327	69.522	170.176	0.12011	-0.02051	0.42084	-0.17268	1.2973	1.5323	-0.0712	0.5569	0.8467	-3770.0
44.100	155.244	69.421	170.058	0.11892	-0.02736	0.42050	-0.17268	1.3023	1.6072	-0.0664	0.5533	0.8103	-3774.3
44.150	155.193	69.266	169.949	0.11739	-0.03356	0.41979	-0.17268	1.3125	1.6884	-0.0582	0.5456	0.7774	-3778.5
44.200	155.179	69.061	169.852	0.11558	-0.03874	0.41872	-0.17268	1.3281	1.7710	-0.0459	0.5331	0.7499	-3782.8
44.250	155.203	68.811	169.774	0.11354	-0.04250	0.41732	-0.17268	1.3486	1.8474	-0.0297	0.5155	0.7300	-3787.1
44.300	155.267	68.527	169.716	0.11136	-0.04456	0.41564	-0.17268	1.3723	1.9086	-0.0124	0.4956	0.7190	-3791.4
44.350	155.363	68.218	169.680	0.10911	-0.04509	0.41374	-0.17268	1.3967	1.9502	0.0005	0.4787	0.7162	-3795.7
44.400	155.483	67.893	169.660	0.10686	-0.04466	0.41170	-0.17268	1.4194	1.9757	0.0073	0.4667	0.7184	-3800.0
44.450	155.620	67.557	169.651	0.10465	-0.04380	0.40957	-0.17268	1.4390	1.9905	0.0097	0.4585	0.7229	-3804.3
44.500	155.766	67.213	169.649	0.10248	-0.04280	0.40736	-0.17268	1.4545	1.9974	0.0106	0.4520	0.7282	-3808.6
44.550	155.920	66.868	169.654	0.10037	-0.04171	0.40513	-0.17268	1.4655	1.9966	0.0116	0.4460	0.7340	-3812.9
44.600	156.079	66.524	169.665	0.09832	-0.04050	0.40290	-0.17268	1.4724	1.9886	0.0129	0.4404	0.7404	-3817.2
44.650	156.240	66.187	169.681	0.09632	-0.03917	0.40070	-0.17268	1.4755	1.9740	0.0142	0.4352	0.7475	-3821.5
44.700	156.401	65.860	169.702	0.09440	-0.03769	0.39856	-0.17268	1.4757	1.9538	0.0156	0.4304	0.7553	-3825.8
44.750	156.559	65.548	169.727	0.09256	-0.03608	0.39650	-0.17268	1.4736	1.9292	0.0171	0.4262	0.7638	-3830.0
44.800	156.714	65.252	169.756	0.09080	-0.03433	0.39454	-0.17268	1.4700	1.9013	0.0184	0.4224	0.7731	-3834.3
44.850	156.865	64.976	169.789	0.08913	-0.03244	0.39270	-0.17268	1.4654	1.8714	0.0197	0.4190	0.7831	-3838.6
44.900	157.009	64.719	169.825	0.08755	-0.03044	0.39098	-0.17268	1.4605	1.8402	0.0208	0.4159	0.7937	-3842.9

TIME	X VEL	Z VEL	A/C VEL	THETA	THETA DOT	AOA	DE	CL	CL-*	CM	CD	ANFP	ALT
44.950	157.147	64.484	169.863	0.08608	-0.02833	0.38939	-0.17268	1.4555	1.8086	0.0218	0.4133	0.8048	-3847.2
45.000	157.278	64.270	169.903	0.08472	-0.02613	0.38793	-0.17268	1.4509	1.7771	0.0226	0.4110	0.8164	-3851.5
45.050	157.402	64.079	169.946	0.08347	-0.02385	0.38661	-0.17268	1.4467	1.7463	0.0233	0.4089	0.8284	-3855.8
45.100	157.519	63.909	169.990	0.08234	-0.02152	0.38543	-0.17268	1.4430	1.7164	0.0238	0.4071	0.8407	-3860.0
45.150	157.628	63.761	170.036	0.08132	-0.01915	0.38438	-0.17268	1.4399	1.6876	0.0241	0.4056	0.8532	-3864.3
45.200	157.730	63.633	170.083	0.08042	-0.01675	0.38346	-0.17268	1.4374	1.6599	0.0243	0.4043	0.8659	-3868.6
45.250	157.825	63.527	170.131	0.07965	-0.01433	0.38267	-0.17268	1.4353	1.6335	0.0244	0.4032	0.8787	-3872.9
45.300	157.912	63.441	170.179	0.07899	-0.01191	0.38201	-0.17268	1.4337	1.6083	0.0244	0.4023	0.8914	-3877.2
45.350	157.992	63.375	170.229	0.07846	-0.00950	0.38148	-0.17268	1.4324	1.5843	0.0242	0.4015	0.9042	-3881.5
45.400	158.065	63.328	170.279	0.07804	-0.00711	0.38106	-0.17268	1.4315	1.5614	0.0240	0.4010	0.9168	-3885.8
45.450	158.130	63.299	170.329	0.07774	-0.00474	0.38077	-0.17268	1.4309	1.5397	0.0236	0.4006	0.9293	-3890.1
45.500	158.188	63.290	170.379	0.07757	-0.00241	0.38059	-0.17268	1.4305	1.5191	0.0232	0.4003	0.9417	-3894.4
45.550	158.239	63.297	170.429	0.07750	-0.00012	0.38052	-0.17268	1.4303	1.4996	0.0228	0.4002	0.9538	-3898.6
45.600	158.283	63.322	170.479	0.07755	0.00212	0.38056	-0.17268	1.4304	1.4813	0.0222	0.4003	0.9657	-3902.9
45.650	158.319	63.363	170.528	0.07771	0.00430	0.38070	-0.17268	1.4307	1.4640	0.0216	0.4005	0.9773	-3907.2
45.700	158.349	63.420	170.577	0.07798	0.00643	0.38094	-0.17268	1.4312	1.4479	0.0210	0.4008	0.9885	-3911.5
45.750	158.373	63.492	170.626	0.07836	0.00848	0.38128	-0.17268	1.4320	1.4328	0.0202	0.4013	0.9994	-3915.8
45.800	158.389	63.577	170.673	0.07883	0.01046	0.38171	-0.17268	1.4330	1.4189	0.0194	0.4018	1.0100	-3920.1
45.850	158.400	63.676	170.719	0.07940	0.01236	0.38223	-0.17268	1.4342	1.4060	0.0186	0.4025	1.0201	-3924.4
45.900	158.404	63.787	170.764	0.08006	0.01417	0.38282	-0.17268	1.4357	1.3942	0.0177	0.4034	1.0297	-3928.7
45.950	158.402	63.910	170.808	0.08082	0.01590	0.38349	-0.17268	1.4374	1.3835	0.0168	0.4043	1.0390	-3933.0
46.000	158.394	64.042	170.851	0.08165	0.01753	0.38423	-0.17268	1.4395	1.3740	0.0158	0.4054	1.0477	-3937.3
46.050	158.381	64.184	170.892	0.08257	0.01906	0.38502	-0.17268	1.4418	1.3655	0.0148	0.4065	1.0559	-3941.6
46.100	158.362	64.333	170.931	0.08356	0.02049	0.38588	-0.17268	1.4444	1.3581	0.0138	0.4078	1.0635	-3945.9
46.150	158.339	64.490	170.968	0.08461	0.02182	0.38678	-0.17268	1.4472	1.3517	0.0127	0.4092	1.0706	-3950.2
46.200	158.311	64.652	171.004	0.08574	0.02303	0.38772	-0.17268	1.4502	1.3463	0.0115	0.4106	1.0771	-3954.5
46.250	158.278	64.820	171.037	0.08692	0.02413	0.38869	-0.17268	1.4533	1.3419	0.0104	0.4122	1.0831	-3958.8
46.300	158.242	64.991	171.068	0.08815	0.02511	0.38970	-0.17268	1.4565	1.3382	0.0093	0.4138	1.0884	-3963.1
46.350	158.201	65.164	171.096	0.08943	0.02599	0.39073	-0.17268	1.4597	1.3354	0.0081	0.4155	1.0931	-3967.4
46.400	158.157	65.340	171.123	0.09074	0.02674	0.39178	-0.17268	1.4628	1.3332	0.0070	0.4173	1.0973	-3971.7
46.450	158.109	65.517	171.146	0.09210	0.02738	0.39284	-0.17268	1.4658	1.3316	0.0058	0.4192	1.1008	-3976.0
46.500	158.058	65.695	171.167	0.09348	0.02791	0.39391	-0.17268	1.4685	1.3305	0.0047	0.4212	1.1037	-3980.2
46.550	158.004	65.872	171.186	0.09489	0.02833	0.39499	-0.17268	1.4709	1.3299	0.0036	0.4232	1.1060	-3984.5
46.600	157.947	66.049	171.201	0.09631	0.02864	0.39607	-0.17268	1.4729	1.3296	0.0026	0.4253	1.1078	-3988.8
46.650	157.887	66.225	171.213	0.09775	0.02885	0.39715	-0.17268	1.4745	1.3295	0.0016	0.4275	1.1090	-3993.1
46.700	157.824	66.399	171.223	0.09919	0.02896	0.39824	-0.17268	1.4755	1.3296	0.0006	0.4297	1.1097	-3997.3
46.750	157.758	66.572	171.229	0.10064	0.02897	0.39932	-0.17268	1.4759	1.3298	-0.0003	0.4321	1.1099	-4001.6
46.800	157.689	66.744	171.232	0.10209	0.02890	0.40040	-0.17268	1.4757	1.3299	-0.0012	0.4345	1.1096	-4005.8
46.850	157.617	66.913	171.232	0.10353	0.02873	0.40147	-0.17268	1.4748	1.3300	-0.0020	0.4369	1.1089	-4010.1
46.900	157.542	67.082	171.229	0.10496	0.02849	0.40255	-0.17268	1.4731	1.3299	-0.0028	0.4395	1.1077	-4014.3
46.950	157.463	67.249	171.223	0.10638	0.02818	0.40363	-0.17268	1.4706	1.3295	-0.0035	0.4421	1.1061	-4018.6
47.000	157.381	67.415	171.213	0.10778	0.02780	0.40471	-0.17268	1.4671	1.3287	-0.0041	0.4449	1.1042	-4022.8

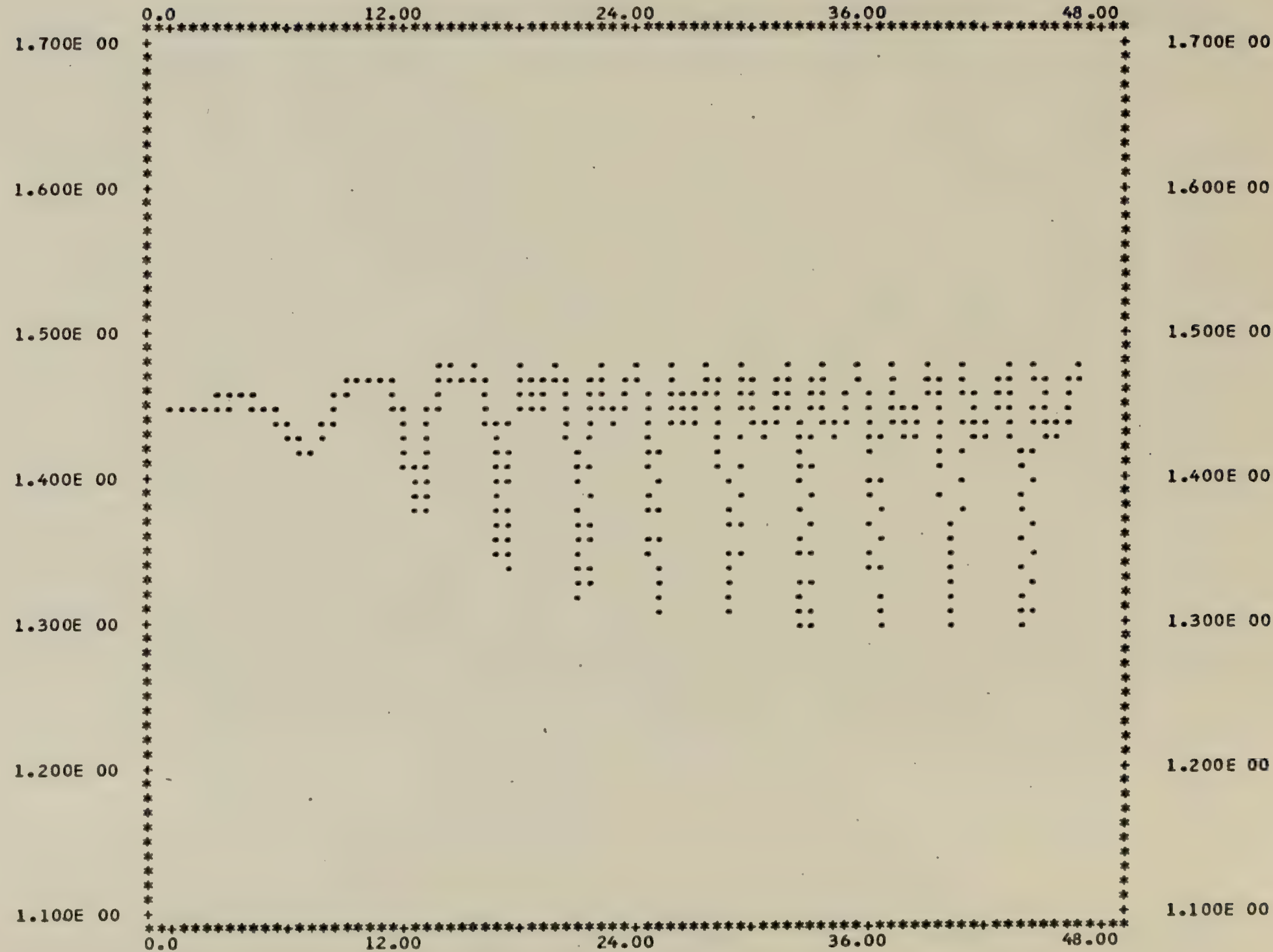
RESULTANT AIRCRAFT VELOCITY(KTS.) VS. TIME

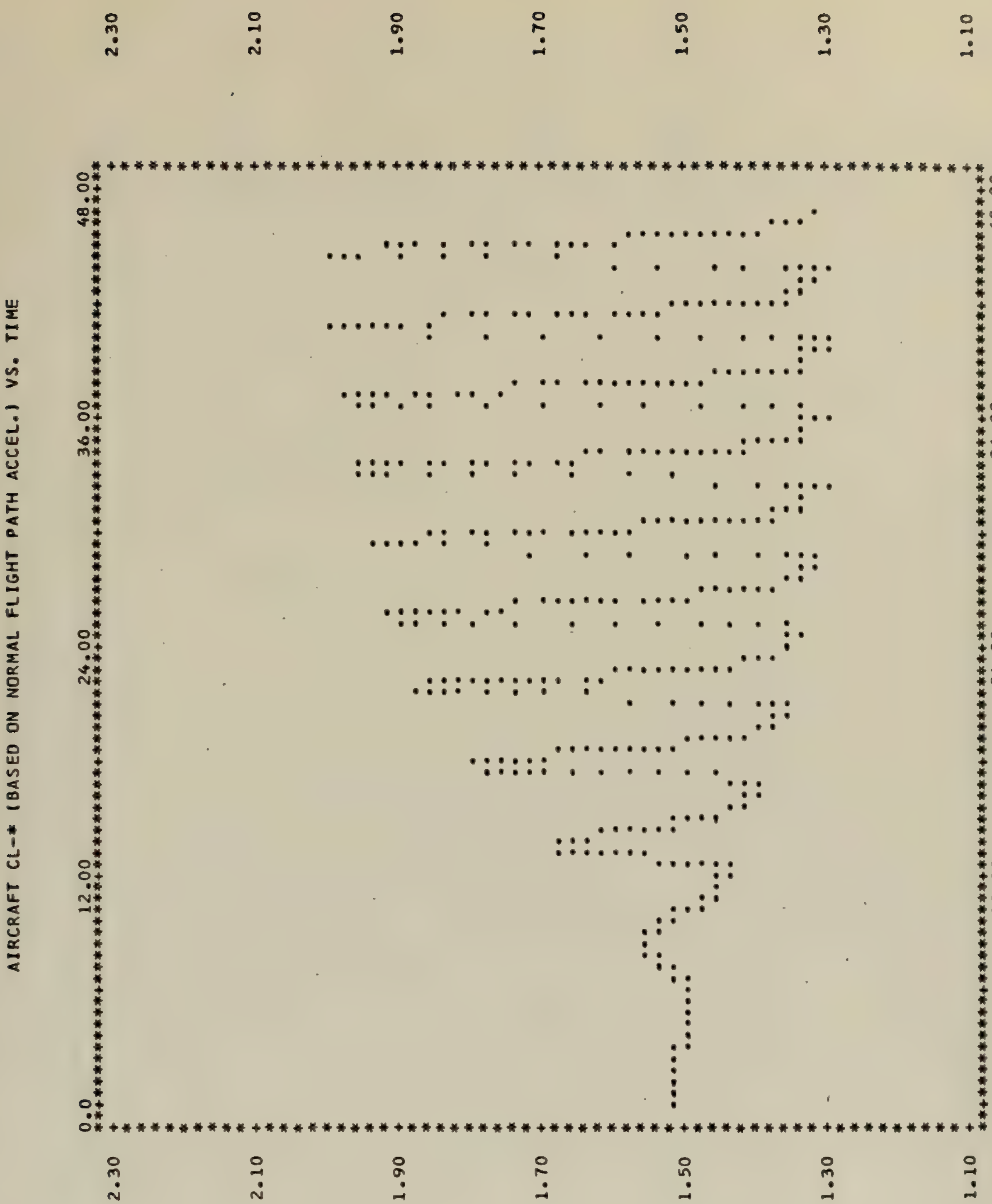


AIRCRAFT AOA VS. TIME

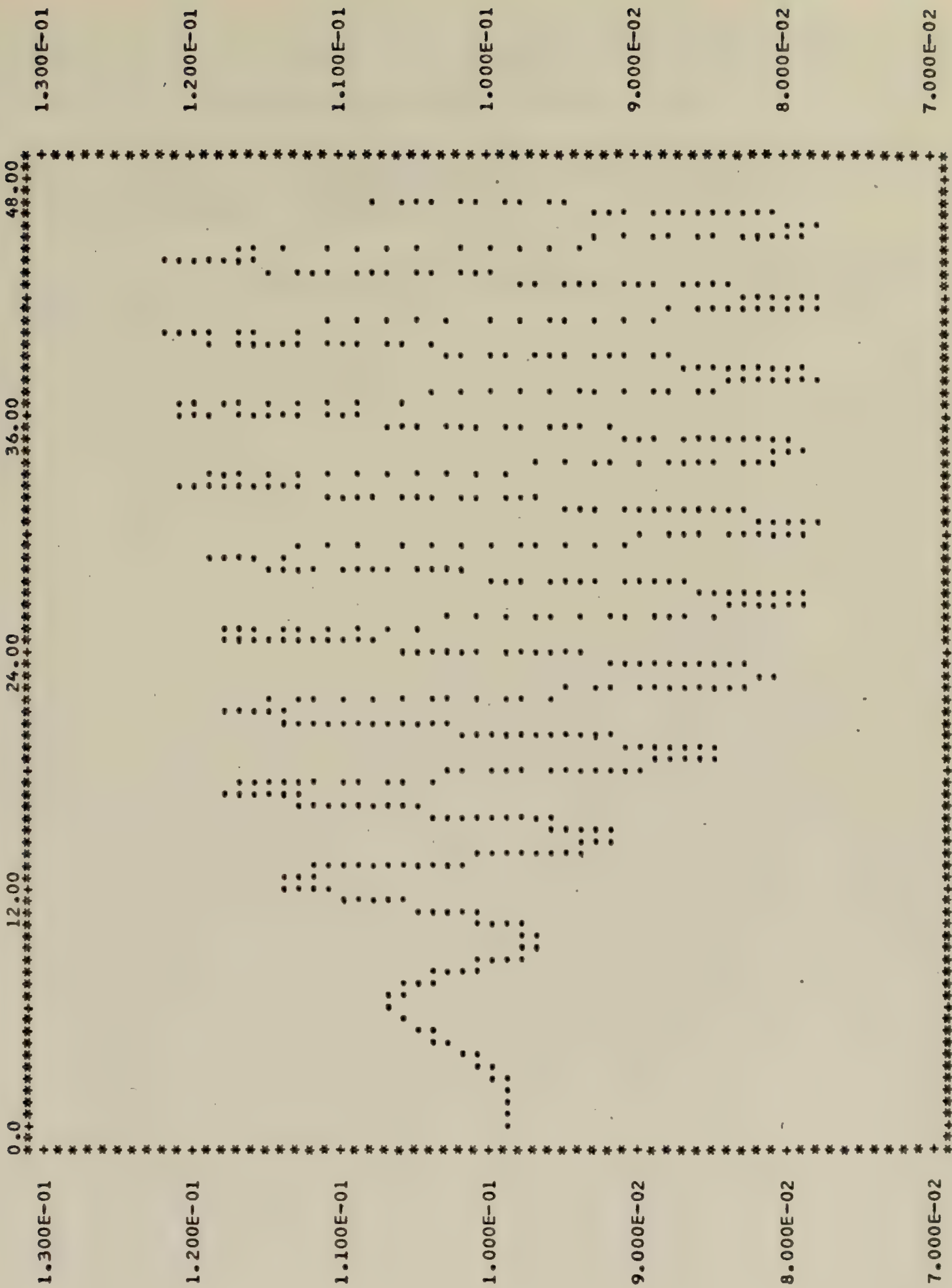


AIRCRAFT CL VS. TIME




AIRCRAFT CL-* (BASED ON NORMAL FLIGHT PATH ACCEL.) VS. TIME
0.0
12.00
24.00
36.00
48.00
2.30
2.10
1.90
1.70
1.50
1.30
1.10

THETA VS. TIME



LIST OF REFERENCES

1. Blakelock, J.H., Automatic Control of Aircraft and Missles.

2. Etkin, B., Dynamics of Flight, Wiley, 1959.

3. Saul, Carlton W., Evaluation of Minimum Aircraft Flying Speed by Digital Simulation, M.S. Thesis, Naval Postgraduate School, Monterey, California, 1972.

4. Minorsky, N., Theory of Nonlinear Control Systems, McGraw-Hill, 1969.

BIBLIOGRAPHY

1. Anon.: Federal Aviation Regulations, Part 25-Airworthiness Standards: Transport Category Airplanes, Federal Aviation Administration, 1967.

2. Anon.: Flying Qualities of Piloted Airplanes, Military Specification MIL-F-008785A(USAF), 31 October 1968.

3. National Aeronautics and Space Administration Technical Note D-5806, Flight Comparison of Several Techniques for Determining the Minimum Flying Speed for a Large, Subsonic Jet Transport, by D.A. Kier, June 1970.

4. Butenin, N.V., Elements of the Theory of Nonlinear Oscillations, Blaisdell Publishing Company, 1965.

INITIAL DISTRIBUTION LIST

		No. Copies
1.	Defense Documentation Center Cameron Station Alexandria, Virginia 22314	2
2.	Library, Code 0212 Naval Postgraduate School Monterey, California 93940	2
3.	Mr. H. Andrews NAIR 5301 Department of the Navy Washington, D.C. 20360	1
4.	Chairman, Department of Aeronautics Naval Postgraduate School Monterey, California 93940	1
5.	Professor Louis V. Schmidt Department of Aeronautics Naval Postgraduate School Monterey, California 93940	1
6.	Assistant Professor Michael Redlin Department of Aeronautics Naval Postgraduate School Monterey, California 93940	1
7.	Lieutenant John T. Frederiksen 10808 Spring Lane Lemoore, California 93245	1

Security Classification

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY *(Corporate author)* Naval Postgraduate School Monterey, California 93940	2a. REPORT SECURITY CLASSIFICATION Unclassified 2b. GROUP

3. REPORT TITLE

An Evaluation of the Longitudinal Dynamic Stability of an Aircraft at Stall

4. DESCRIPTIVE NOTES *(Type of report and, inclusive dates)*

Master's Thesis; June 1972

5. AUTHOR(S) *(First name, middle initial, last name)*

John Thomas Frederiksen

6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
June 1972	74	4

8a. CONTRACT OR GRANT NO. b. PROJECT NO. c. d.	9a. ORIGINATOR'S REPORT NUMBER(S) 9b. OTHER REPORT NO(S) *(Any other numbers that may be assigned this report)*

10. DISTRIBUTION STATEMENT

Approved for public release; distribution unlimited

11. SUPPLEMENTARY NOTES	12. SPONSORING MILITARY ACTIVITY
	Naval Postgraduate School Monterey, California 93940

13. ABSTRACT

The longitudinal stability of an aircraft at or near stall was examined using the digital computer as an experimental tool to solve the longitudinal equations of motion. A linear analysis determined the effect of lift curve slope variation. An investigation was made to identify the nonlinear lift curve variations needed to create the often observed "rocking-chair" or "porpoising" stall trait. The characteristics of this limit-cycle oscillation were examined.

DD FORM 1 NOV 65 1473 (PAGE 1)

S/N 0101-807-6811

Security Classification

A-31408

14. KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
Dynamic stability						
Stall						
Limit cycle						